



NASA CR-

140306

(NASA-CR-140306) STUDY OF OXYGEN GAS
PRODUCTION PHENOMENON DURING STAND AND
DISCHARGE IN SILVER-ZINC BATTERIES Final
Report (Eagle-Picher Industries, Inc.,
Joplin, Mo.) 75 p HC \$6.75 CSCL 10C

N74-34545

Unclas

63/03 52711

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EAGLE-PICHER INDUSTRIES, INC.



STUDY OF OXYGEN GAS PRODUCTION PHENOMENON
DURING STAND AND DISCHARGE IN
SILVER-ZINC BATTERIES

FINAL REPORT

CONTRACT NO. NAS9-12032

8 OCTOBER 1974

ORIGINAL
COLOR PHOTOGRAPH

EAGLE-PICHER INDUSTRIES, INC.
Electronics Division
Couples Department
Joplin, Missouri

1.0 INTRODUCTION

It has been known before the LM operation that silver oxide-zinc cells generated some oxygen along with hydrogen during open circuit stand and discharge. It was reasoned theoretically that the source of the oxygen was associated with the positive and the hydrogen from the negative. Both sources were reasoned to be due to "side" reactions and not an essential part of the electrochemical cell reaction. The general objective of this contract, the modifications and additions were to obtain information concerning this oxygen generation with the specific objective of reducing (or eliminating) the amount generated. This should reduce the probability of a gas explosion. The requirements for a gas explosion are the simultaneous presence of a hot point of ignition with the oxygen-hydrogen ratio within the explosive limits (approximately 3-97% oxygen).

The Phase A portion of the contract was designed to obtain information on the effect of various treatments and preparation variables. This work was reported in a Final Report, dated 2 May 1973. At the closure of this phase of the contracts, a continuation was issued to include the work of this Final Report (Phase B) of the contract. The work of Phase B is outlined in the statements of work in the modifications dated 14 June 1972 and 14 May 1973 to the Contract NAS9-12032. The specific work is outlined in the attachment to a letter dated 28 June 1973, Ref. 211-0673/GMB to Jerry Haptonstall, Buyer, NASA, from Mr. George Babb, Contracts Administrator, E.P.I. A copy of this letter with attachment is given in Appendix I.

The effort was organized into three main parts. Part 1 includes the production of two groups of positive plates, the manufacture of cells from each group, and the accumulation of randomly selected plates for future testing. Part 2 includes the testing of 10 cells and 10 plates resulting from Part 1 shortly after their manufacture. Part 3 includes the controlled storage of the remaining cells and plates from Part 1 and subsequent testing of these.

1.1 Definitions

- LM - Lunar Module operation. EPI developed and produced the Descent and Ascent batteries.
- "PRODUCTION" - The technique and procedures followed by the EPI production section used for LM positive plates.
- "SPECIAL" - Procedures as modified and detailed in Appendix I for the positive plates used in this series of tests.
- C/41.5 - Rate, amperes, of charge or discharge when the capacity in ampere-hours is transferred in 41.5 hours.
- MEAN - Average or sum of a set of data divided by the number of such.
- MEAN SQUARE - $\frac{\text{Sum (Data)}^2}{N-1} - \frac{(\text{Sum Data})^2}{(N) (N-1)}$
- SIGMA - Square root of "Mean Square"
- F-NUMBER - Ratio largest of two mean squares to the smallest.
- VOLUMES OF GAS- In cubic centimeters.
- R.T. - Room Temperature
- 50 or 140 HOUR- Volume of oxygen collected and measured during 50 hours.
- RESPONSE - of discharge or 140 hours of open circuit stand.
- SIGNIFICANT - A difference is significant if the F number is greater than the tabled critical value.

2.0 FACTUAL DATA AND DISCUSSION

2.1 Plate and Cell Manufacture

Phase A of the contract (Final Report, 2 May 1973) arrived at the effect of several variables tending to influence the gassing (oxygen generation) during open circuit stand and during discharge. The letter of 28 June 1973

(Appendix I) specifically outlined that applying to the Part I of the present work. Since the testing involved in Phase A was necessarily on a small scale, the formations consisted of 16 plates each while the production run is ordinarily not less than 200 plates. To achieve more control in the former, the plates are formed in series while in the latter all plates are connected in parallel. The current is specifically known in the first case throughout the formation, but in the parallel configuration the total current is controlled and it is assumed that the impedance of each plate is equal. This is not possible so there exists a source of variation of the charging. Several changes were necessary but which were readily accomplished. A deionizer was installed in the feed water lines to permit a by-pass of the "as is" water. A water heater was installed between the wash tank and the dionizer for control of the wash temperature. The temperature controller on the oven was verified in the particular temperature range desired. The "SPECIAL" formation is so designated and follows the specifications given in the letter of 28 June 1973 (Appendix I) while the "PRODUCTION" formation followed the modified LM procedure. No deviations or modifications were made. All jigs and cell fabrication equipment, as well as component parts were made available from the LM operation. The plates from each formation were sorted and assigned to cells by the same method used for the regular LM cells and batteries. A "fold-over" method was used in a computer program whereby the ordered plates by oxygen weight are assigned to cells to make the maximum number of cells with a minimum sigma for the cells. For this work the "SPECIAL" formation is designated #1 while the "PRODUCTION" formation is designated #2. Tables numbered numerically appear in Appendix II, while all figures and tables listed alphabetically appear in the report near the point of reference. For this reporting, Tables No. 1 and 2 were made by listing

plate serial numbers for each. Tables NO. 3 and 4 show each cell assignment of the plates along with the totals, mean and sigmas. The percent oxygen is the weight of the oxygen pick-up over the sintered weight less the grid weight. The theoretical quantity of oxygen for Ag₂O on this basis is 14.77%. Plates designated and maintained for plate testing were those from the following "cells": 2, 8, 12, 20 and 26 which made a total of 45 plates. These correspond to the test articles 1.0(b) and 1.0(c), with the remaining cell numbers actually made up as cells for the "SPECIAL" set. The "PRODUCTION" set was made up according to Table NO. 4 except that cell No. 21 and the plates marked "accepted but not used" are available for plate tests.

2.2 Cell and Plate Tests

The storage requirements are specified in the contract, along with the actual gassing tests on each. The important dates for timing on storage are:

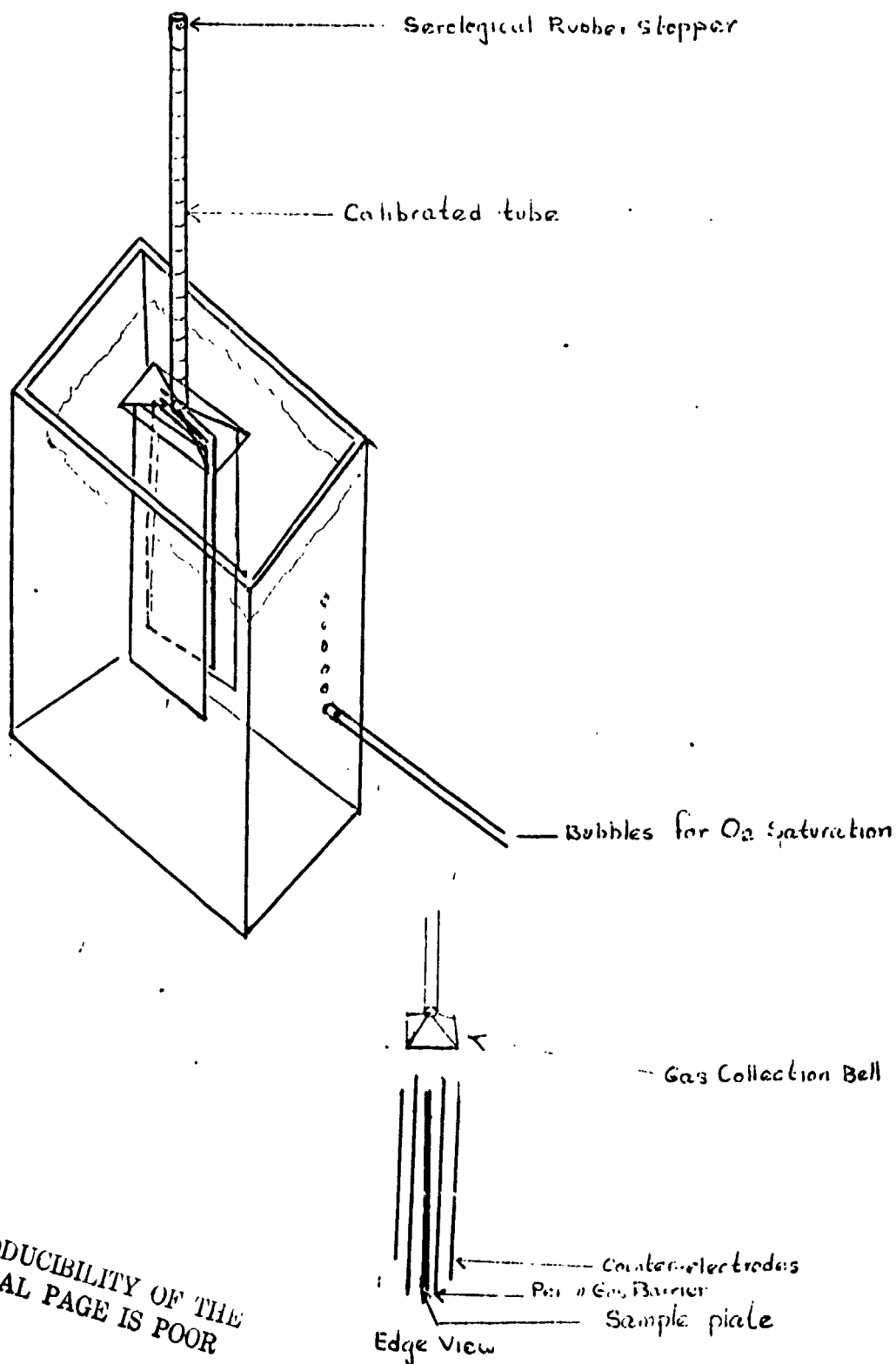
<u>Date</u>	<u>Lapsed Time</u>	<u>Note</u>
1 Nov 1973	0	Plate processing completed and plates sorted for cells.
7 Nov 1973	7	Cells and plates delivered and stored at R.T.
12 Nov 1973	5	5 "SPEC" and 5 "PROD" cells activated, 13 plates on test at open circuit (10 "SPEC" and 3 "PROD")
15 Nov 1973	3	The 10 cells on OC test.
20 Nov 1973	5	13 Plates on Disch. test
20 Nov 1973	0	Storage of plates and remaining cells at R.T. completed and storage started at 40°F, Para. 2.1(a).
24 Nov 1973	4	10 cells on Disch. test
20 Jan 1974	74	End of R.T. storage from 7 Nov 1973, (2.1(a)) Start of 40°F storage (2.1(b))

22 Apr 1974	92	Start Group 1 plates - Para. 2.1(f)
23 Apr 1974	93	Cells activated - Para. 2.1(c)
24 Apr 1974	1	Start Group 2 plates - Para. 2.1(f)
27 Apr 1974	3	Cells O.C. stand - Para. 2.1(d)
5 May 1974	9	Group 1 cells on disch. - Para. 2.1(e)
7 May 1974	11	Group 2 cells on disch. - Para. 2.1 (e)

A diagram of the plate testing cell is shown in Figure A. The plate-testing set-up is shown in Figure B with the cells in the background. Figure C is a closer photograph of the cell test setup showing the gas collecting burettes. Gas analyses were made with an Orsat analyser operated with some refinements to improve the accuracy and sensitivity. Hydrogen (nitrogen would do equally well) was used to flush the system before sampling to reduce contamination from oxygen in the air into the unknown sample. A rubber sampling tube 1/8 inch diameter with a fine (27 ga.) needle fixed to the end was used to transfer the gas from the collector to the analyser. A serological stopper had been previously mounted in the collecting system. The accuracy and reproducibility was verified by measuring the absorption and calculating the percent with the "pure" hydrogen and a 53.4 cc sample of hydrogen-air made by introducing 10.0% air into the hydrogen. The oxygen was calculated back to air on a dry basis as 20.95 vs 20.99% as a tabled value. Sensitivity was observed by the reproducibility with pure hydrogen starting with a known volume and scrubbing the gas for oxygen repeatedly with a reproducibility of +/-0.2cc. During the work on Phase A of the contract, gas chromatography was used. Excellent detection of hydrogen in oxygen was obtained but the column gradually deteriorated, presumably due to moisture, and its use to measure composition with a large quantity of hydrogen was poor. On another gas analysis project, a different gas chromatograph was used and the same experience was observed. It was therefore deemed necessary to refine the Orsat analyser

FIGURE NO. A

DIAGRAMMATIC SKETCH OF SETUP



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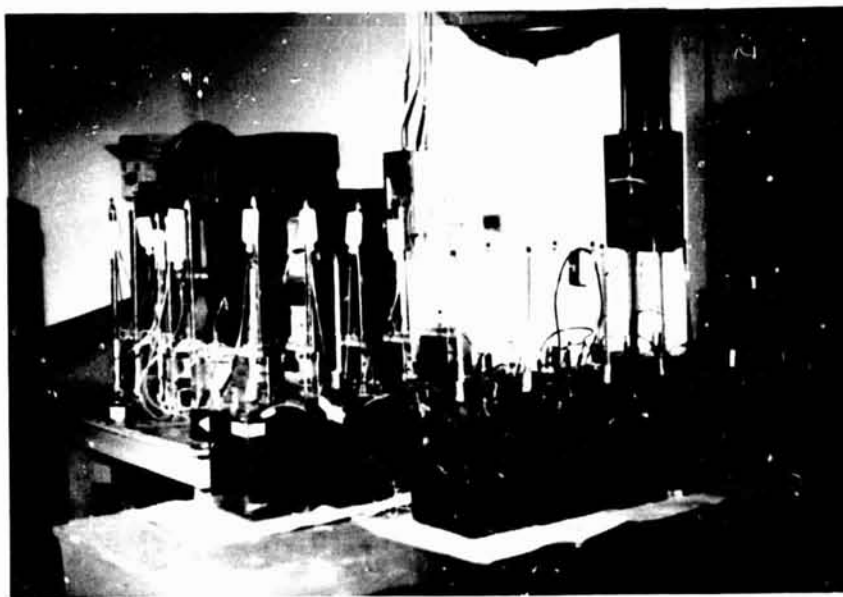


FIGURE B

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Testing in Phase B, Part 2
Plates in foreground

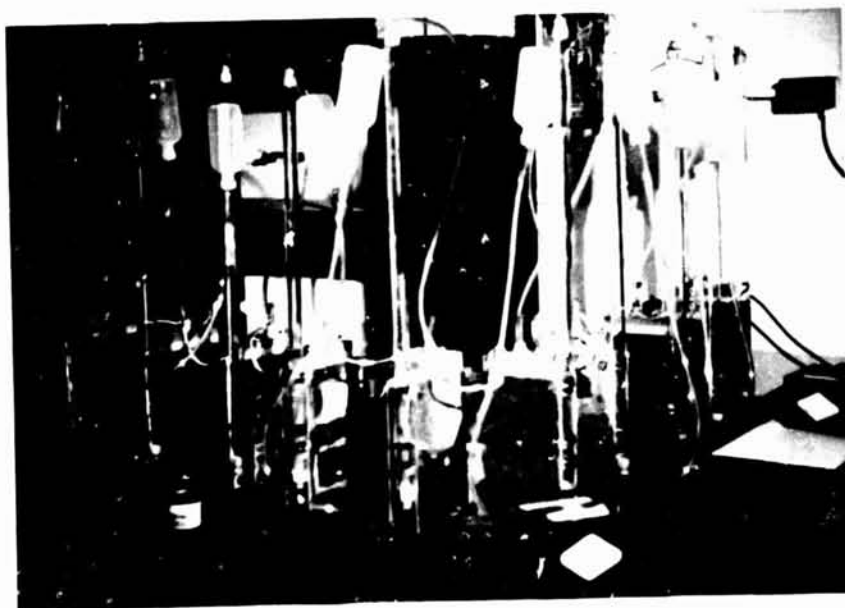


FIGURE C

Testing in Phase B, Part 2
Cell Testing

to measure hydrogen and oxygen with the assumption that these are the only two gases given off. Measuring tubes for both the plates and the cells were calibrated from length so measurements to volume in cubic centimeters could be made. No correction was made for the difference from sea level (733 vs. 760 mm.) since the Phase A work made no such correction. The responses made for evaluation of the plates is the same as that used in Phase A (the accumulated volume in cc at 140 hours for open circuit and the same for discharge at 50 hours). In this report "Total" gas is used to designate the volume of hydrogen plus oxygen and "accumulated" gas as the total at this point. The discharge current was specified for the cells as 10 amperes and the plates as 1 ampere.

The testing outlined in Paragraph 2.1(c) and (d) was carried out using cells shown on Figure No. E at room temperature. After the ten-day period on open circuit, the cells were transferred to the 40°F bath (Figure D) to conduct the testing outlined in 2.1(e). The assignment of plates for the cells of these tests is shown in Table No. 14. The data for the cells are listed accordingly to the original cell numbers, "SPECIAL" = "S" (16) and "PRODUCTION" = "P" (15). The plate testing, 2.1(f), was done in the 40°F bath (Figure D) prior to the cell testing. The plates were tested in two groups of 15 each, one group (1st Group) discharged at 2.6 amperes, which corresponds to C/16 rate, and the other group (2nd Group) discharged at 1.0 ampere, which corresponds to C/41.5 rate.

2.3 Cell and Plate Test Data

Table No. 5 lists the total gas accumulated from each cell while Table No. 6 lists the actual oxygen volumes determined from the total gas at the indicated times. Also, the accumulated oxygen under "Tot. oxygen" is listed in the last column of Table No. 6. Corresponding to these Open Circuit gas tables are Tables No. 7 and 8 for the discharge gas tests. Table No. 9 lists the per-

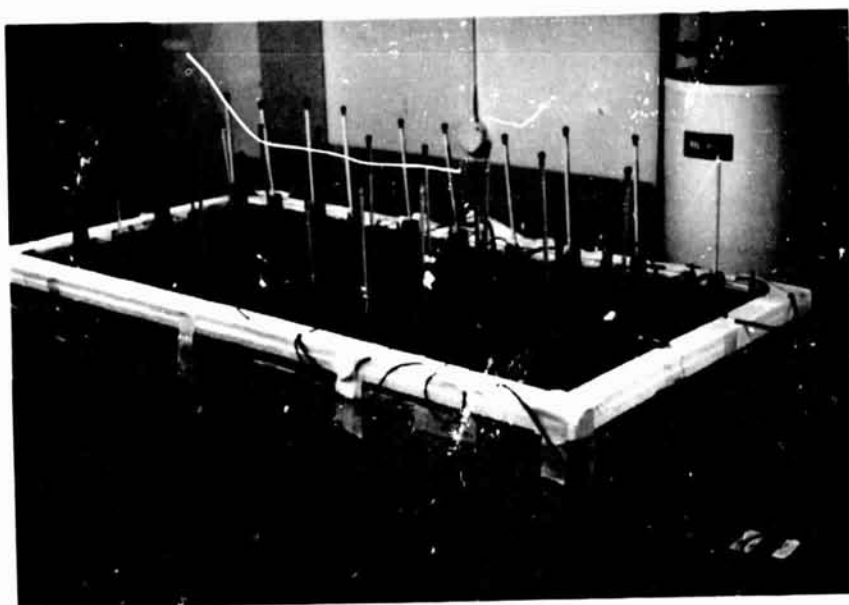


FIGURE D

Plate Testing in 40°F bath in
Phase E, Part 3

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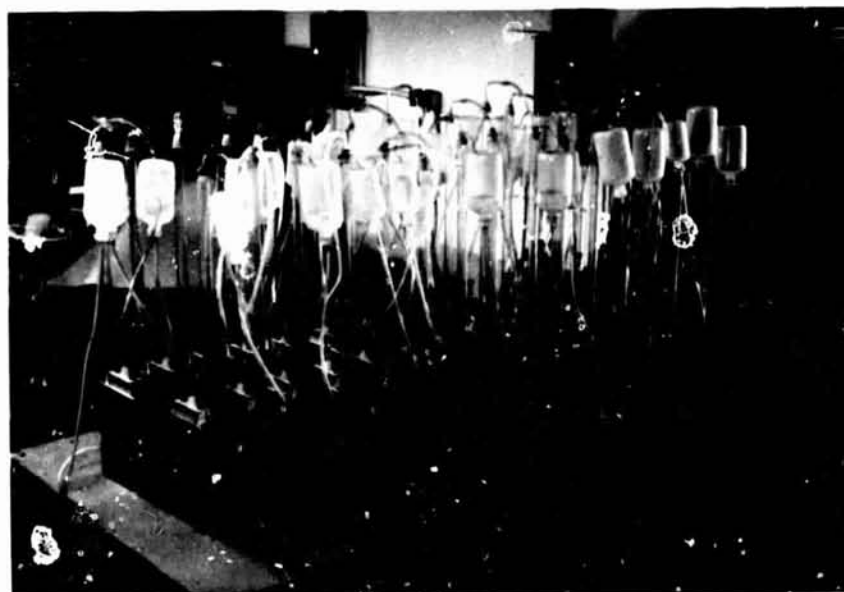


FIGURE E

Cell Testing at Room Temperature
in Phase E, Part 3. These cells
were later transferred to 40°F
bath for discharge.

tinent electrical data from the cell tests. Tables No. 10, 11 and 12 contain the gas evolution data for the plate tests. Plate Tests No. 1, 2, and 3 are three "PROD" plates while the remainder are "SPEC" tests. The capacities of the plates are entered in Table No. 11 on the last line. Table No. 12 lists the individual response for all the plate tests. Table No. 13 lists the various responses and results for the 10 cells tested in Phase B, Part 2. Tables following No. 13 are used for analysis given in the next section.

The contract specifies that 15 "SPECIAL" plates be discharged at C/16 rate (2.6 amperes) and another 15 be discharged at the C/4...5 rate (1.0 ampere) while being held at $40^{\circ} \pm 5^{\circ} \text{F}$ after the 40°F storage. The oxygen generated during the discharge of these two groups of plates is tabulated in Tables No. 15 and 16 and the 50 hour responses are listed in Table No. 17. The electrical data for these two groups are listed in Table No. 18.

The contract calls for the cells to be stored at room temperature for 10 days \pm 1 day followed by discharge at 10 amperes while being held $40^{\circ} \pm 5^{\circ} \text{F}$. The cells generate substantial quantities of hydrogen from the negative plate reaction along with the positive plate oxygen. Again, the total gas and the oxygen volumes are listed in Tables No. 19 ("Special, Total"), 20 ("Prod" Total), 21 ("Special", oxygen), 22 ("Prod" oxygen). The discharge data for the cells are correspondingly listed in Tables No. 23, 24, 25 and 26. The electrical data during discharge are listed for each group of cells in Table No. 27, 28, 29 and 30. The oxygen generated by the cells and the volumes accumulated are listed in Tables No. 31, 32, and are summarized in Table No. 33. For these Part 3 data, Table No. C is an extension of Table No. A for the Part 2 results.

2.4 Discussion

Several comparisons are possible at the Part 2 stage of the testing:

- (1) Present "PRODUCTION" vs. "SPECIAL" plates and cells.
- (2) Present "PRODUCTION" vs. "PRODUCTION" plates made at the beginning of the contract.
- (3) Present "PRODUCTION" and "SPECIAL" plates vs. cells.
- (4) "SPECIAL" plates vs. the predictions made (letter, 28 June 1973, App. 1).
- (5) "SPECIAL" plates vs. P. Junction plates made at the beginning of the contract.

Several statistical analyses are possible other than the above but will not be done in this report in the interest of time and because such is not indicated in the contract. For instance, a comparison could be made between the current LM production formation vs. the parallel formations could be compared. Also, performance comparison of the LM Acceptance Test cells vs. those in this study would be possible.

If information estimating the mean, mean square, sigma, and the number of observations is available several statistical comparisons as significant differences may be estimated. One such procedure is to calculate the ratio of the mean squares using the smaller number in the denominator which yields a quantity call the "F" number. To estimate if there is a significant difference between two samples, as the above, is to compare this F number with the critical tabled value which depends on the confidence level and the degrees of freedom (number of observations -1) in the numerator and the denominator. If the F number is larger than the critical value, there is a significant difference; if smaller there is no difference. Table No. A is a listing of the pertinent quantities for the tests. After Table No. A, a table (A-5) of critical F values for a 90% confidence level has been included for use in comparisons. The

various combinations to answer the above questions are listed in Table No. B. Inspection of the calculated F numbers indicate few that are significantly different. Present "PRODUCTION" and the "SPECIAL" set are not different (Question #1). Both present "PRODUCTION" and the "SPECIAL" are significantly lower gassing than the initial production (Question #2 and 5). The cells are not different from the plates for both the "PRODUCTION" and the "SPECIAL" sets. This may become significant when a larger number of cells and plates are tested as the sample will be increased.

The comparison with the "best" prediction for the "SPECIAL" set is difficult to assess since the predictions were negative. When a prediction is made that obviously is in an impossible region, it means the region of the prediction is being extrapolated and the effects of the factors do not continue in the indicated direction from the data region. It probably follows that the factor levels would reduce the gassing the larger amount but the actual prediction is obviously incorrect.

It should be noted that cell gassing of oxygen should be less than for plates due to the oxygen reaction by the negative plate (the plate tests were against counter electrodes of silver so that no mechanisms existed to take up the evolved oxygen). In the cells the oxygen given off by the positive would at least partially diffuse in the upper regions to the negative where reaction occurs. The efficiency of this reaction to scrub the hydrogen of the oxygen is probably poor and would not consistently reduce the amount below the explosive limit (3%-97% oxygen). Also, the amount and rate of generation of hydrogen would be an important factor. This is seen in the present tests as the quantity of oxygen and hydrogen ranged from below the limit to above the limit in the ten cells.

TABLE NO. A - SUMMARY OF ALL TESTS SHOWING MEAN, MEAN SQUARE, SIGMA,
AND THE NUMBER OF DEGREES OF FREEDOM OF EACH.
DATA COVERED IS TO CONCLUSION OF PART 2 OF PHASE B.

CC

DESCRIPTION	MEAN	M.S.	SIGMA	D/F	TESTED - CONTRACT PART
1. PROD-A- OC, PL.	26.67	138.32	11.76	7	PHASE A
2. PROD-A-DIS. PL.	12.16	35.19	5.93	7	PHASE A
3. PROD-B- OC, PL	29.28	98.54	9.93	6	PHASE A
4. PROD-B-DIS. PL.	20.95	13.23	3.64	6	PHASE A
5. PROD-C- OC, PL.	6.88	1.96	1.40	2	PHASE B - PART 2
6. PROD-C-DIS. PL.	7.90	3.24	1.80	2	PHASE B - PART 2
7. SPECIAL OC, PL.	5.98	4.67	2.16	9	PHASE B - PART 2
8. SPECIAL DIS. PL.	9.16	6.35	2.52	9	PHASE B - PART 2
9. PROD-C-OC, CELLS	1.74	1.43	1.19	4	PHASE B - PART 2
10. PROD-C-DIS. CELLS	5.42	6.10	2.47	4	PHASE B - PART 2
11. SPECIAL OC, CELLS	2.88	0.500	0.707	4	PHASE B - PART 2
12. SPECIAL DIS, CELLS	7.80	11.60	3.42	4	PHASE B - PART 2

NOTE-
A AND B ARE PRODUCTION EARLY IN THE CONTRACT - PHASE A.
C IS THE PRESENT PRODUCTION FOR PHASE B USE.

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(PLACE AFTER TABLE NO. A)

TABLE A-5. PERCENTILES OF THE F DISTRIBUTION



F_P

n_1 = degrees of freedom for numerator

n_2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86	60.19	60.71	61.22	61.74	62.00	62.26	62.53	62.79	63.06	63.33
2	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.41	9.42	9.44	9.45	9.46	9.47	9.47	9.48	9.49
3	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23	5.22	5.20	5.18	5.18	5.17	5.16	5.15	5.14	5.13
4	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92	3.90	3.87	3.84	3.83	3.82	3.80	3.79	3.78	3.76
5	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32	3.30	3.27	3.24	3.21	3.19	3.17	3.16	3.14	3.12	3.10
6	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94	2.90	2.87	2.84	2.82	2.80	2.78	2.76	2.74	2.72
7	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72	2.70	2.67	2.63	2.59	2.58	2.56	2.54	2.51	2.49	2.47
8	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.50	2.50	2.46	2.42	2.40	2.38	2.36	2.34	2.32	2.29
9	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44	2.42	2.38	2.34	2.30	2.28	2.25	2.23	2.21	2.18	2.16
10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32	2.28	2.24	2.20	2.18	2.16	2.13	2.11	2.08	2.06
11	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27	2.25	2.21	2.17	2.12	2.10	2.08	2.05	2.03	2.00	1.97
12	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21	2.19	2.15	2.10	2.06	2.04	2.01	1.98	1.96	1.93	1.90
13	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16	2.14	2.10	2.05	2.01	1.98	1.96	1.93	1.90	1.88	1.85
14	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12	2.10	2.05	2.01	1.96	1.94	1.91	1.89	1.86	1.83	1.80
15	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06	2.02	1.97	1.92	1.90	1.87	1.85	1.82	1.79	1.76
16	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06	2.03	1.99	1.94	1.89	1.87	1.84	1.81	1.78	1.75	1.72
17	3.03	2.64	2.42	2.31	2.22	2.15	2.10	2.06	2.03	2.00	1.96	1.91	1.86	1.84	1.81	1.78	1.75	1.72	1.69
18	3.01	2.62	2.40	2.29	2.20	2.13	2.08	2.04	2.00	1.98	1.93	1.89	1.84	1.81	1.78	1.75	1.72	1.69	1.66
19	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98	1.96	1.91	1.86	1.81	1.79	1.76	1.73	1.70	1.67	1.63
20	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96	1.94	1.89	1.84	1.79	1.77	1.74	1.71	1.68	1.64	1.61
21	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95	1.92	1.87	1.83	1.78	1.75	1.72	1.69	1.66	1.62	1.59
22	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93	1.90	1.86	1.81	1.76	1.73	1.70	1.67	1.64	1.60	1.57
23	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92	1.89	1.84	1.80	1.74	1.72	1.69	1.66	1.62	1.59	1.55
24	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91	1.88	1.83	1.78	1.73	1.70	1.67	1.64	1.61	1.57	1.53
25	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89	1.87	1.82	1.77	1.72	1.69	1.66	1.63	1.59	1.56	1.52
26	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88	1.86	1.81	1.76	1.71	1.68	1.65	1.61	1.58	1.54	1.50
27	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91	1.87	1.85	1.80	1.75	1.70	1.67	1.64	1.60	1.57	1.53	1.49
28	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87	1.84	1.79	1.74	1.69	1.66	1.63	1.59	1.56	1.52	1.48
29	2.88	2.50	2.28	2.15	2.06	1.99	1.93	1.89	1.86	1.83	1.78	1.73	1.68	1.65	1.62	1.58	1.55	1.51	1.47
30	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82	1.77	1.72	1.67	1.64	1.61	1.57	1.54	1.50	1.46
40	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79	1.76	1.71	1.66	1.61	1.57	1.54	1.51	1.47	1.42	1.38
60	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74	1.71	1.66	1.61	1.54	1.51	1.48	1.44	1.40	1.35	1.29
120	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68	1.65	1.60	1.55	1.48	1.45	1.41	1.37	1.32	1.26	1.19
∞	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63	1.60	1.55	1.49	1.42	1.38	1.34	1.30	1.24	1.17	1.00

n_2 = degrees of freedom for denominator

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TABLE NO. B - CALCULATED F NUMBERS FOR VARIOUS COMPARISONS

COMPARISONS	CALC. F NUMBER	CRITICAL F
QUESTION NO. 1		
CELLS-OC 9/11	1.43/.5=2.36	F(4,4) 4.11
CELLS-DIS 12/10	11.60/6.10=1.90	F(4,4) 4.11
PLATES-OC 7/5	4.67/1.90=2.36	F(9,2) 9.38
PLATES-DIS 3/6	6.35/3.24=1.96	F(9,2) 9.33
QUESTION NO. 2		
PLATES-OC 1/5	156.52/1.96=70.6	F(7,2) 9.35
PLATES-DIS 2/6	35.19/3.24=10.85	F(7,2) 9.35
PLATES-OC 3/5	98.54/1.96=5.02	F(6,2) 9.33
PLATES-DIS 4/6	13.23/3.24=4.08	F(6,2) 9.33
QUESTION NO. 3		
CELL/PL-OC 5/9	1.96/1.43=1.37	F(2,4) 9.24
CELL/PL-DIS 10/6	6.10/3.24=1.88	F(2,4) 9.24
CELL/PL-OC 7/11	4.67/.5=9.35	F(2,4) 9.24
CELL/PL-DIS 3/12	11.60/6.35=1.82	F(2,4) 9.24
QUESTION NO. 4		
PLATES-OC 1/11	133.32/.5=277.	F(7,4) 3.93
PLATES-DIS 2/12	55.19/11.60=3.05	F(7,4) 3.93
PLATES-OC 3/11	98.54/.5=197.	F(6,4) 4.01
PLATES-DIS 4/12	13.23/11.60=1.40	F(6,4) 4.01

The tests performed in Part 3 of the contract permit several additional comparisons. Table No. C, similar to Table No. A, summarizes the various sets which can be used either within each table or between those in Table A.

The sequential numbers in these tables are used to identify the test data. The following comparisons are indicated:

- (6) Compare discharge total oxygen vs. 50 hour response

PROD-C-DIS CELLS # 10 vs. PROD-C-DIS. CELLS Tot. Ox. #13
(Tables A and C)

SPEC-DIS CELLS #12 vs. SPEC-DIS. CELLS Tot. Ox. #14
(Tables A & C)

- (7) Compare R. T. Open Circuit PROD. and SPECIAL Cells before 40°F stand (#9 and #11) and after stand (#17 and 18). (Tables A & C)

- (8) Compare 40°F DIS. with 40°F Stand Cells and R.T. Dis. w/o 40°F stand cells: PROD (19. vs. 12.), SPECIAL (20. vs. 12.) (Tables A & C)

- (9) Compare R.T. Open Circuit PROD. Cells after 40°F Stand (17.) and SPECIAL Cell (18.) after like treatment (Table C)

- (10) Compare 40° DIS. PROD. cells after 40°F stand (19) and SPECIAL CELLS (20.) of like treatment. (Table C)

- (11) Compare C/41.5 Discharge Plates vs. C/16 Discharge Plates at 40°F without an Open Circuit Stand, #16/#15. (Table C)

- (12) Compare the sum of SPECIAL O.C. and DIS. at R.T. and 1. ampere (7 & 8) and DIS. w/o Open Circuit at 40°F at 1. amp (16). (Tables A and C)

Table D (corresponding to Table B) lists the F number comparisons for the above Part 3 comparisons (6 through 12). The conclusions possible from these data are indicated in the next section.

A discussion is in order to summarize some possible reasons to account for the current production of positive plates being of lower amounts of oxygen generation over that found from production at the beginning of the Part A of the contract.

TABLE NO. C - SUMMARY OF ALL TESTS IN PHASE B, PART 3 SHOWING THE MEAN,
MEAN SQUARE, SIGMA AND THE DEGREES OF FREEDOM FOR EACH

DESCRIPTION	CC		M.S.	SIGMA	D/F	TESTED - CONTRACT PART
	MEAN					
13. PROD.-C-DIS.CELLS TOT.OX USED	4.87	4.54	2.13	4	4	PHASE B - PART 2.
14. SPEC.DIS.CELLS TOT. OX.USED	6.85	9.04	3.01	4	4	PHASE B - PART 2.
15. SPEC. DIS.1ST GR.PL. 2.6AMP.-50HR.RESP.	25.18	49.90	7.06	14	14	PHASE B - PART 3
16..SPEC. DIS.2ND GR.PL. 1.AMP.-50HR.RESP.	24.17	131.72	11.48	14	14	PHASE B - PART 3.
17.PROD.-C-O.C.CELLS R.T.-140. HR.RESP.	5.60	4.72	2.17	14	14	PHASE B - PART 3.
18.SPECIAL OC CELLS R.T.-140HR. RESP.	7.32	13.48	3.67	15	15	PHASE B - PART 3.
19.PROD.-C-DIS.CELLS 40.DEG. TOT.OX. USED	11.75	34.48	5.87	14	14	PHASE B - PART 3.
20.SPEC. DIS.CELLS 40.DEG.TOT.OX. USED	14.14	31.96	5.65	15	15	PHASE B - PART 3.

TABLE NO. D - CALCULATED F NUMBERS FOR VARIOUS COMPARISONS FOR PART 3 DATA.

COMPARISONS	CALC. F NUMBER	CRITICAL F
QUESTION NO. 6		
CELLS-DIS. 13/10	6.10/4.54=1.34	F(4, 4)=4.11
CELLS-DIS. 12/14	11.60/9.04=1.32	F(4, 4)=4.11
QUESTION NO. 7		
CELLS-O.C. 17/9	4.72/1.43=3.30	F(14, 4)=3.88
CELLS-O.C. 18/11	13.48/0.50=26.96	F(15, 4)=3.87
QUESTION NO. 8		
CELLS-DIS. 19/12	34.48/11.60=2.97	F(14, 4)=3.88
CELLS-DIS. 20/12	31.96/11.60=2.93	F(15, 4)=3.87
QUESTION NO. 9		
CELLS-O.C. 18/17	13.48/4.72=2.85	F(15, 14)=2.01
QUESTION NO. 10		
CELLS-DIS. 19/20	34.48/31.96=1.08	F(14, 15)=1.98
QUESTION NO. 11		
PLATES-/C. 16/15	131.72/49.90=2.62	F(14, 14)=2.02
QUESTION NO. 12		
PLATES-DIS 16/(7+8)	131.72/5.51=23.7	F(14, 14)=2.02

An obvious possible explanation for this difference that a change may have occurred in the specified production manufacturing procedure had been instituted between the two manufacturing dates, November 1971, and October 1973. The production processing sheets were located for the entire period and no difference was found from that shown in Table No. I of Appendix I under "Production Level". The cause or causes for the significantly lower oxygen generation from the production plate must, therefore, lie in variables that are difficult to control. As indicated earlier in this report, the charge acceptance during formation has a high variance. This factor, being an important variable in oxygen generation might well create variance either between periods of production or within current production itself. Temperature and time during drying is also an important variable. Most driers are subject to both time and temperature variance due to variation of moisture load within each plate and variation in the total number of plates dried during one loading. As the plates become dried, the actual temperature of the plates tends to rise with a change in rate since the cooling from the evaporation is no longer effective. Knowing what the temperature profiles are over a substantial area and volume of plates is difficult. Consequently, a control is made at an arbitrary point sensing the heated air so as to prevent the plates from seeing a higher temperature than the control maximum cut-off point. Since temperature has been shown also to be an important variable affecting oxygen liberation, variance from this source might be expected. The other variables that were found in the first contract to influence oxygen evolution may be reasoned similar to the above on drying and charge acceptance, and might well develop additional variance.

The LM battery program was completed before the results of the first contract were summarized and finally reported (May 1973). It was thus impossible to incorporate the factors into the LM production procedures.

3.0 CONCLUSIONS

- (1) The "SPECIAL" plates predicted to have low oxygen had lower oxygen than the original Production plates but were not significantly lower than the current production plates. (Tables A & C).
- (2) No statistically significant difference was observed between current production cells and plate generation of oxygen.
- (3) The oxygen generated in cells was sufficiently low to be under the explosive limit in the cells when a higher rate of hydrogen generation was seen but for lower rates the oxygen was within the explosive limit.
- (4) No statistical significance was observed between the "SPECIAL" and the current "PRODUCTION" test articles in either cells or plates.
- (5) Use of the total oxygen as the response in place of the 50 hour accumulation is not significantly different (Question 6).
- (6) The effect of three-month unactivated storage at 40°F. is seen from Question No. 7. Both the PRODUCTION and the SPECIAL cells show an increase in the mean oxygen responses (accumulation at 140 hours). The F numbers for the PRODUCTION cells is slightly less than critical while that for the SPECIAL cells is very significant (that an increase in open circuit oxygen resulted from the 40°F unactivated stand).
- (7) The comparison for Discharge gas must combine the treatment of 40°F stand and 40°F discharge as shown in Question No. 8. Neither PRODUCTION nor SPECIAL articles showed significance; both had an increase in the means.

- (8) Comparing the O.C. gas for PRODUCTION and SPECIAL cells as to the effect of 40°F stand (Question No. 9) comparisons 17 and 18 of Table No. C are used. No significant difference was seen.
- (9) Comparing the Discharge gas for PRODUCTION and SPECIAL cells as to the effect of 40°F stand (Question No. 10) uses comparisons 19 and 20, Table No. C. No significant difference is seen.
- (10) The effect of two current rates (C/16 and C/41.5) in Question No. 11 uses comparisons 15 and 16, Table No. C, and shows no significant difference. The conclusion is thus reached that the oxygen is to be lost from the plate regardless of how the discharge rate may differ.
- (11) Since the plates were not given open circuit stand treatment, a comparison may be made (Question No. 12) of 7 plus 8, Table No. A, versus comparison 16, Table No. C to observe if the open circuit gas would ultimately be generated during discharge when not lost prior to discharge. The ultimate generation of gas during discharge is shown very significantly.

4.0 RECOMMENDATIONS

The effort of this contract was primarily directed toward locating preparation treatments that tend toward decreasing the oxygen. A limited effort was directed (Task IV) toward locating treatments that would decrease the oxygen produced. The net result of this work was generally to increase the oxygen gas from the plates. Thus, it appears that the current production procedures result in plates and cells which produce the lowest quantities of oxygen. Some possible treatments that may result in lower oxygen evolution might be:

- (1) Electrolyte treatment such as decreasing amplitude sinusoidal charge-discharge treatment as a function of temperature, concentration and composition (K_2CO_3) of the potassium hydroxide electrolyte.
- (2) The effect of reduced pressure on plates immersed in electrolyte, again as a function of temperature and type electrolyte.

APPENDIX I

28 June 1973

Reference: 2112-0673-023/GMB

National Aeronautics and Space Administration
Manned Spacecraft Center
Houston, Texas 77058

Attention: Mr. Jerry Haptonstall, Buyer

Reference: Contract NAS9-12032

Gentlemen:

As a result of Mr. Hoyt McBryar's recent trip to Joplin the attached letter and summary has been prepared. Your agreement with the recommendations of this is required before the next phase effort can be started.

A copy of this has been sent directly to Mr. McBryar by Mr. Dixon to facilitate distribution.

Very truly yours,

ELECTRONICS DIVISION
Eagle-Picher Industries, Inc.

George M. Babb
Contract Administrator

GME/sh

Attachments

12.1
12.2
12.3

EAGLE-PICHER INDUSTRIES, INC.

ELECTRONICS DIVISION • P.O. BOX 47, JOPLIN, MISSOURI 64801

26 June 1973

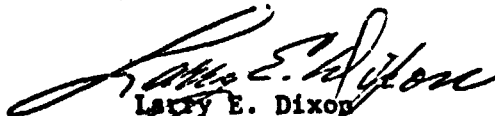
Gentlemen:

As agreed upon during our meeting on 7 June 1973, the enclosure comparing standard production procedures with our recommended treatment is submitted. Also included is a set of predictions from each analysis model for comparison purposes. A recommendation for work optimizing the variables involved in plate processing is presented at the end.

Each variable will be discussed separately in comparing production versus experimental and the resultant recommended levels. A summary is provided in Table I.

If you should have any questions, please do not hesitate to contact us.

Very truly yours,


Larry E. Dixon
Couples Department

LED/bd

Enclosure

✓ VARIABLE NO. 1 - RINSE RATE

Present production procedures utilize two (2) rinse tanks with a capacity of 150 positive plates each. The rinse water is introduced through a common tap with separate drains for each tank. The effective capacity of each tank is 215 liters of water (1.42 l/plate). The exact production rinse rate will vary somewhat according to available water pressure with the rate in the order of 30.5 liter/minute/tank (0.203 l/min/plate).

The experimental rinse rate was 0.125 l/min/plate in a volume of 0.25 l/plate.

The procedure recommended is to slow the rate of flow to approximately 0.125 l/min/plate.

VARIABLE NO. 2 - RINSE TEMPERATURE

Current production routine utilizes water temperature in the range of 120°F.

The best experimental temperature was found at the 110-114°F level.

It is recommended that the temperature be the same for production and experimental production. This would be indicated as the rinse temperature vector was in the direction of higher temperature and the difference between 114°F and 120°F is not significant in light of the variation to be expected utilizing hot water heaters.

✓ VARIABLE NO. 3 - RINSE TIME

Production time of rinse is of the order of 25 ± 5 minutes.

Experimental results indicated the shorter rinse time of 15 minutes as the minimum gassing direction.

A rinse time of 15 ± 5 minutes is recommended for the experimental

production plates.

✓ VARIABLE NO. 4 - DRYING TEMPERATURE

Production drying utilizes air circulating ovens set at $120 \pm 10^{\circ}\text{F}$.

The cooler drying temperature of 100°F was found to be the minimum gassing vector experimentally.

It is recommended that the drying oven be reset to $100 \pm 10^{\circ}\text{F}$ for the experimental production run.

✓ VARIABLE NO. 5 - DRYING TIME

Typical production drying time is of the order of four (4) hours. Experimental results indicate the longer drying time direction of 42.5 hours. It is, therefore, recommended that the experimental production plates be dried for $42.5 \pm .5$ hours.

✓ VARIABLE NO. 6 - CHARGE CURRENT

A current density equivalent to 3.5 amps/plate is utilized in current production formation.

Experimental results indicated a lower current density equivalent to 2.3 amps/plate to be superior to 3.5 amps/plate in producing less gas.

Experimental production current density of 2.3 amps/plate is proposed.

✓ VARIABLE NO. 7 - PERCENT CHARGE

A number of ampere-hours or charge equivalent to 175% of the theoretical number of ampere-hours necessary to promote all of the active silver to AgO is used in current production.

This same percentage of charge was found experimentally to be preferable over 125% theoretical. It is recommended that the same percentage of charge be utilized in both sets of plates.

✓ VARIABLE 8 - DISCHARGE CURRENT AND VARIABLE 9 - DISCHARGE TIME

Present production formations utilize a discharge routine of 5.75 amps/plate for three (3) hours inserted at the midpoint of the charge routine.

Experimental results indicated this same routine as being the minimum gassing level combination.

It is recommended, therefore, that this same routine be utilized in the experimental production plates.

VARIABLE 10 - DOUBLE (BOOSTER) CHARGE

This routine is not utilized in regular production. Experimental results showed the absence of the double charge to be the minimum gas level.

It is recommended that this routine be disregarded.

VARIABLE 11 - FORMATION TEMPERATURE

Normal production formulations are conducted at the prevailing room temperature. Experimentally, a formation temperature of 75°F was found superior to the opposing level of 57°F.

A formation temperature controlled to 75° ± 5°F is recommended for the experimental production plates.

✓ VARIABLE 12 - WASH WATER

Ordinary tap water is utilized to rinse plates in standard production. Deionized water was found experimentally to be very superior to tap water in gas reduction.

Deionized water is recommended for use in preparing the experimental plates.

VARIABLES NO. 13 AND 19 - KOH CONCENTRATION

A concentration of 31% KOH by weight is utilized currently in production formation. Experimental results indicated little if any difference in the use of 20% and 30% KOH in formation while 40% KOH was found to produce more gassing.

The 31%, or regular production concentration, is recommended as no discernable difference was detected with 20% KOH and 31% KOH is a standard item.

VARIABLE NO. 14 - COUNTERELECTRODES

Nickel counterelectrodes are used in production formation tanks. Experimental comparison of silver counterelectrodes with the nickel counterelectrodes indicated a slight preference for nickel. It is proposed that the counterelectrodes remain nickel in the experimental production.

✓ VARIABLE NO. 15 - K₂CO₃ CONCENTRATION

Production formation tanks are set to contain as little K₂CO₃ as possible (<0.4%) although this concentration will rise as contact with air is maintained. A K₂CO₃ concentration of approximately 4% was found experimentally to result in reduced gassing.

It is proposed to adjust the K₂CO₃ concentration to $4.0 \pm .5\%$ in the formation tanks for the experimental production plates.

VARIABLE NO. 16 - SINTERED WEIGHT

The weight of active material in a plate is controlled within specific limits. Experimentally, the sintered weight was not found to substantially effect gassing.

The sintered weight of the plates will be maintained within the current specifications.

VARIABLE NO. 17 - PERCENT OXYGEN PICKUP

This variable is dependent upon the variables utilized in formation and processing.

VARIABLE NO. 18 - DRY STAND TIME

This variable is specified in the contract requirements and will, therefore, be the same for both regular production and experimental production.

VARIABLE NO. 20 - DISCHARGE ROUTINE

This variable is specified by Variables 8 and 9 with the presence of the discharge routine leading to minimum gassing.

PREDICTIONS BASED ON ANALYSIS MODELS

For comparison purposes, predictions of several variable combinations using the analysis models were made. Table II lists the variable levels used for each combination (Observations 1 and 2 were necessary only for prediction purposes). The production prediction (Obs. 3) used variable levels that corresponded to those actually used in production at the present. The "Best 1" (Obs. 4) corresponded to the level found by experimentation to present the minimum gassing resultant overall. "Best 2" (Obs. 9) is a variation of "Best 1" in the respect that the most questionable variable (Variable 4) was set at the opposing level. Observations 5, 6, 7 and 8 constitute the minimum gassing levels predicted for the maximum oxygen pickup, minimum open circuit gas, minimum discharge gas and minimum combined gas models respectively.

Table III lists the predictions of the combinations of Table II for each of the four (4) models. As can be seen from the predictions, the recommended variable levels ("Best 1" or Obs. 4) presents a near optimum when all cases are considered.

RECOMMENDATIONS FOR FURTHER STUDY

The method of analysis utilized in the present scope of the contract has been limited to a two level approach. While this technique is effective in predicting the variable direction for minimum gassing resultant it inherently relies on a linear function for each variable. While linear functions are quite possible, it is not probable that all the variables examined would exhibit linear functions toward minimum gassing.

This is best exemplified by variables 13 and 19 which examine the concentration of potassium hydroxide in plate formation. This was the only function examined to a greater extent than two levels. The results of analysis indicated that little effect on gassing is exhibited by KOH concentrations of 20% versus concentrations of 30%. On the other hand, a 40% concentration of KOH was found to markedly increase the gassing rate. This obviously indicates an optimum range of potassium hydroxide concentration for minimum gassing.

This result lends credence to the approach that many of the variables could be optimized by further investigation. An interaction approach seems most feasible to determine a minimum response for each variable. This would involve altering a variable's value until a region of minimum gassing could be bracketed. Successive bracketing would result in narrowing the range of the variable's value to the desired degree of optimization. A non-linear regression analysis could be utilized in minimizing the number of trials necessary to locate the optimum variable value.

In the case of potassium hydroxide concentration, this might amount to examining intermediate concentrations of, say, 25% and 35%. For purposes of explanation, suppose the 35% concentration gave a value of gassing greater than 30% but less than 40% and the 25% concentration a value less than 30% or 20%. This would then indicate the minimum gassing concentration lay between 30% and 20%. The process could then be repeated using concentrations of 22.5% and 27.5%. If the 22.5% concentration gave a value higher than 25% but less than 30% and the 27.5% presented a value less than either 25% or 30%, then the optimum concentration would be further defined as being between 30% and 25%. This could be illustrated by Figure 1. The process could be repeated as many times as desired or practical. Variable values could be extended to provide evidence of linearity or non-linear functions if no optimization point could be detected.

FIGURE 1

HYPOTHETICAL OPTIMIZATION CURVE FOR KOH

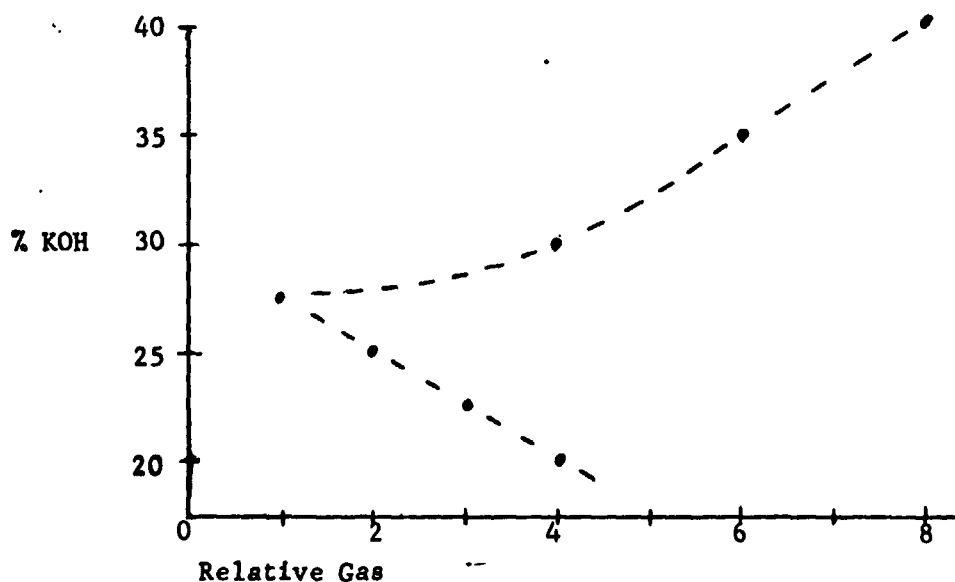


TABLE I

PRODUCTION ROUTINE VS. EXPERIMENTAL ROUTINE

<u>VARIABLE</u>	<u>EXPERIMENTAL LEVELS</u> + -		<u>PRODUCTION LEVEL</u>	<u>RECOMMENDED LEVELS</u>
1	0.125 1/min/plate	0.250 1/min/plate	0.203 1/min/plate	0.125 1/min/plate
2	110-114°F	75°F	120°F	120°F
3	4 Hours	15 Minutes	25 ± 5 Min.	15 ± 5 Min.
4	140°F	100°F	120 ± 10°F	100 ± 10°F
5	42.5 Hrs.	18.5 Hrs.	4 Hrs.	42.5 ± .5 Hrs.
6	2.3 Amp/Plate	3.5 Amp/Plate	3.5 Amp/Plate	2.3 Amp/Plate
7	175%	125%	175%	175%
8	5.75 Amp/Plate	3.8 Amp/Plate	5.75 Amp/Plate	5.75 Amp/Plate
9	4.5 Hrs.	3.0 Hrs.	3.0 Hrs.	3.0 Hrs.
10	With	Without	Without	Without
11	75°F	57°F	Room Temperature	75 ± 5°F
12	Tap	Deionized	Tap	Deionized
13	30%	20%, (40%)	31%	31%
14	Ni	Ag	Ni	Ni
15	.1%	4%	<.4%	4%
16	High	Low	Quality Control	Quality Control
17	High	Low	Determined By Routine	Determined By Routine
18	13 Days	1-2 Days	Variable	As Specified
19	40%	20%, (30%)	31%	31%
20	None	Any Current/Time	As Vars. 8 & 9	As Vars. 8 & 9

TABLE II

<u>VARIABLE</u>	<u>OBSERVATION</u>								
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
1	-	+	-	+	+	+	+	+	+
2	-	+	+	+	+	+	+	+	+
3	-	+	-	-	-	-	-	+	-
4	-	+	+	-	-	+	-	-	+
5	-	+	-	+	+	+	+	+	+
6	-	+	-	+	-	-	+	+	+
7	-	+	+	+	-	+	-	N/A	+
8	-	+	+	+	-	+	N/A	+	+
9	-	+	-	-	-	+	-	+	-
10	-	+	-	-	N/A	-	+	N/A	-
11	-	+	+	+	-	+	-	+	+
12	-	+	+	-	+	-	-	-	-
13	-	+	+	N/A	+	N/A	N/A	N/A	N/A
14	-	+	+	+	-	+	N/A	N/A	+
15	-	+	+	-	-	-	-	-	-
16	-	+	N/A	N/A	-	N/A	N/A	N/A	N/A
17	-	+	+	-	N/A	-	-	-	-
18	-	+	+	+	N/A	+	+	+	+
19	-	+	-	-	+	-	-	-	-
20	-	+	-	-	-	-	+	-	-

TABLE III
PREDICTIONS

REPRODUCIBILITY OF THE
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RESIDUALS AND PREDICTIONS : PERCENT OXYGEN PICK-UP

OBS	Y(OBS)	Y(PRED)	RESIDUAL	S.E.(Y)	NORM DEV	RESIDUALS SSQS
1	0.0000	14.6007	-14.6007	0.0641	-123.529	213.1820377
2	0.0000	12.3381	-12.3381	0.1122	-104.386	365.4124764
3	0.0000	14.1427	-14.1427	0.0709	-119.654	565.4304215
4	0.0000	14.0400	-14.0400	0.0974	-118.785	762.5538344
5	0.0000	15.7282	-15.7282	0.1103	-133.068	1009.9300553
6	0.0000	14.0459	-14.0459	0.0780	-118.835	1207.2187533
7	0.0000	13.1621	-13.1621	0.1003	-111.357	1380.4597201
8	0.0000	12.3332	-12.3332	0.1031	-104.345	1532.5688505
9	0.0000	13.8216	-13.8216	0.0942	-116.937	1723.6062040

RESIDUALS AND PREDICTIONS: OPEN CIRCUIT GASSING

OBS	Y(OBS)	Y(PRED)	RESIDUAL	S.E.(Y)	NORM DEV	RESIDUALS SSQS
1	0.0000	11.8689	-11.8689	10.9776	-1.434	140.8723453
2	0.0000	54.2910	-54.2910	11.1601	-6.560	3088.3852596
3	0.0000	7.8264	-7.8264	5.1647	-0.945	3149.6377010
4	0.0000	-9.3676	9.3676	7.7761	1.132	3237.3896541
5	0.0000	63.9010	-63.9010	7.7713	-7.722	7320.7373180
6	0.0000	-28.5114	28.5114	9.2192	3.445	8133.6377067
7	0.0000	28.4040	-28.4040	8.4702	-3.432	8940.4277610
8	0.0000	-21.6819	21.6819	8.5172	2.620	9410.5332260
9	0.0000	-18.3078	18.3078	8.4071	2.212	9745.7070579

RESIDUALS AND PREDICTIONS : DISCHARGE GASSING

OBS	Y(OBS)	Y(PRED)	RESIDUAL	S.E.(Y)	NORM DEV	RESIDUALS SSQS
1	0.0000	3.3840	-3.3840	3.3043	-1.000	11.4517841
2	0.0000	47.7427	-47.7427	4.4315	-14.114	2290.8188533
3	0.0000	11.6570	-11.6570	2.8965	-3.446	2426.7065486
4	0.0000	-15.8702	15.8702	3.7183	4.691	2678.5698299
5	0.0000	25.5287	-25.5287	3.7051	-7.547	3330.2841863
6	0.0000	9.9897	-9.9897	3.5604	-2.953	3430.0795955
7	0.0000	-29.6350	29.6350	4.0239	8.761	4308.3173961
8	0.0000	-10.7661	10.7661	3.6575	3.182	4424.2275524
9	0.0000	-6.2007	6.2007	3.5303	1.833	4462.6757926

RESIDUALS AND PREDICTIONS : COMBINED GAS

OBS	Y(OBS)	Y(PRED)	RESIDUAL	S.E.(Y)	NORM DEV	RESIDUALS SSQS
1	0.0000	4.3051	-4.3051	11.0432	-0.443	18.5342102
2	0.0000	100.3802	-100.3802	15.0581	-10.348	10094.7324485
3	0.0000	26.0981	-26.0981	5.6280	-2.690	10775.8437728
4	0.0000	-23.5303	23.5303	10.0355	2.425	11329.5215072
5	0.0000	98.6583	-98.6583	9.6312	-10.170	21062.9883346
6	0.0000	-9.2681	9.2681	9.0221	0.955	21148.8867721
7	0.0000	-1.9913	1.9913	11.7451	0.205	21152.8516159
8	0.0000	-48.1494	48.1494	10.4187	4.963	23471.2187957
9	0.0000	-17.2690	17.2690	9.4533	1.780	23769.4375534

APPENDIX II

TABLE NO. 1 - COMPLETE LISTING OF 'SPECIAL' POSITIVE PLATES.

PLATE NO	SINTERED WT	FORMED WT	OZ (GH)	O2 PERCENT	PLATE NO	SINTERED WT	FORMED WT	OZ (GH)	O2 PERCENT
1	125.70	141.70	16.00	13.85	51	128.00	143.30	15.30	12.99
2	124.50	140.00	15.50	13.56	52	124.80	140.60	15.80	13.79
3	124.30	139.80	15.50	13.58	53	126.50	142.50	16.00	13.76
4	124.80	139.70	14.90	13.00	54	124.00	139.60	15.60	13.71
5	124.70	139.70	15.00	13.10	55	125.00	140.90	15.90	13.65
6	121.50	137.10	15.60	14.02	56	123.30	138.90	15.60	13.73
7	122.90	0.00	*****	*****	57	124.50	140.50	16.00	14.00
8	124.30	140.30	16.00	14.03	58	123.30	137.90	14.60	12.91
9	126.30	143.00	16.50	14.13	59	126.00	142.20	16.20	13.99
10	123.80	139.50	15.70	13.82	60	125.90	141.20	15.30	13.22
11	125.60	140.70	15.10	13.02	61	124.20	140.00	15.80	13.26
12	123.40	139.50	16.10	14.22	62	123.10	138.80	15.70	13.91
13	125.70	140.20	14.50	12.55	63	123.60	139.20	15.60	13.76
14	124.80	140.80	16.00	13.96	64	124.40	140.40	16.00	14.01
15	124.70	140.20	15.50	13.54	65	125.90	139.90	14.90	12.10
16	121.20	137.00	15.80	14.23	66	124.30	139.50	15.20	13.32
17	126.00	142.40	16.40	14.16	67	126.20	141.50	15.30	13.19
18	122.60	137.80	15.20	13.52	68	124.40	139.80	15.40	13.49
19	124.80	138.20	13.40	11.69	69	124.00	138.30	14.80	13.01
20	125.00	140.90	15.90	13.85	70	124.50	136.50	12.00	10.50
21	122.50	137.90	15.40	13.71	71	125.10	140.90	15.20	13.75
22	125.40	140.50	15.10	13.11	72	124.00	139.80	15.80	13.68
24	124.80	139.50	14.70	12.83	74	123.20	138.00	14.80	13.10
25	124.40	138.00	13.60	11.91	75	124.40	140.00	15.60	13.66
26	124.20	138.40	14.20	12.46	76	123.50	139.40	15.90	14.03
27	123.80	137.50	13.70	12.06	77	125.20	141.20	16.00	13.91
28	121.60	136.80	15.20	13.64	78	126.10	141.30	15.20	13.11
29	125.10	140.50	15.40	13.40	80	125.40	139.90	14.50	12.59
31	124.70	140.30	16.10	14.06	81	124.20	134.50	14.30	12.54
32	124.30	140.50	15.70	13.70	82	122.50	139.10	15.60	13.29
33	125.20	140.50	15.30	13.30	83	124.70	140.40	15.70	13.71
34	123.60	139.20	15.60	13.76	84	122.00	137.10	15.10	13.51
35	121.60	137.50	15.70	14.09	85	124.50	139.30	15.40	13.47
36	125.20	142.30	16.10	14.00	86	125.10	140.00	14.90	12.97
37	125.10	142.10	16.00	13.93	87	124.50	139.80	15.40	13.47
38	123.50	137.20	13.70	12.09	88	124.60	140.30	15.70	13.72
39	123.40	139.00	15.60	13.78	90	125.20	141.30	16.10	14.00
40	124.30	140.30	16.00	14.02	91	121.30	135.60	14.30	12.87
41	123.70	139.00	15.30	13.48	92	125.60	141.60	16.00	13.86
42	124.60	140.70	16.10	14.07	93	125.70	141.60	15.90	13.77
43	123.60	139.10	15.50	13.67	94	126.30	142.50	16.10	13.86
44	125.70	141.70	16.00	13.85	95	123.90	138.90	15.90	14.10
45	123.70	139.70	16.00	14.10	96	125.40	140.50	15.10	13.11
46	125.90	141.60	15.70	13.57	97	127.90	144.10	16.20	13.76
47	125.20	140.20	15.00	13.04	99	120.20	135.70	15.50	14.09
48	123.60	139.10	15.50	13.67	100	121.50	137.40	15.90	14.29
49	124.60	139.80	15.20	13.29					
50	123.60	139.60	16.00	14.11					

TABLE NO. 1 - (CONTINUED)

PLATE NO	SINTERED WT	FORMED WT	U2 (G%)	PERCENT	PLATE NO	SINTERED WT	FORMED WT	U2 (G%)	O2 PERCENT
101	123.80	139.30	15.50	13.64	151	125.10	140.70	15.60	13.58
102	123.70	138.30	15.60	13.87	152	123.80	139.70	15.90	14.00
103	123.30	139.00	15.70	13.88	153	122.70	138.50	15.80	14.04
104	124.20	140.20	16.00	14.04	154	128.00	144.50	16.50	14.01
105	123.30	135.20	13.90	12.51	155	124.80	140.50	15.70	13.70
106	124.20	140.20	16.00	14.04	156	124.90	140.60	15.70	13.59
107	124.90	141.00	16.10	14.04	157	123.20	138.70	15.50	13.72
108	124.70	141.00	15.30	14.24	158	124.10	139.00	14.90	13.92
109	124.50	140.50	16.00	14.00	159	123.10	137.70	15.60	13.82
110	125.60	141.80	16.20	14.04	160	123.50	139.20	15.70	13.86
111	122.30	136.90	14.60	13.02	161	121.70	137.60	15.90	14.26
112	126.40	142.50	16.10	13.86	162	124.80	141.10	16.30	14.22
113	125.10	142.10	16.00	13.93	163	122.90	138.70	15.80	14.02
114	124.00	140.00	16.30	14.06	164	122.30	138.50	15.70	13.94
115	124.60	139.10	14.50	12.67	165	122.50	138.30	15.80	14.07
116	123.00	140.30	15.30	13.33	166	122.70	138.20	15.50	13.78
117	126.00	141.40	15.40	13.30	167	122.60	138.10	15.50	13.72
118	122.20	137.30	15.10	13.48	168	125.40	141.20	15.80	13.72
119	126.70	142.80	16.10	13.82	169	124.80	140.60	15.20	13.26
120	121.60	137.00	15.40	13.32	170	122.90	138.40	15.50	13.75
121	122.30	138.60	15.30	14.03	171	125.20	141.30	16.10	14.90
122	124.20	140.10	15.90	13.95	172	124.20	140.00	15.80	13.56
123	123.20	138.40	15.20	13.45	173	125.50	139.80	14.30	12.40
124	122.00	137.70	15.70	14.04	174	124.30	140.10	15.80	13.85
125	125.10	141.10	16.00	13.75	175	123.90	139.70	15.80	13.90
126	125.10	140.90	15.30	13.75	176	123.90	139.20	15.30	13.46
127	123.60	139.40	15.30	13.93	177	124.60	140.50	15.90	13.90
128	125.40	139.50	16.10	14.22	178	120.60	135.90	15.30	13.66
129	123.60	138.70	15.10	13.52	179	122.70	134.40	15.70	13.96
131	123.50	139.90	16.40	14.47	181	126.40	142.50	16.10	14.15
132	125.90	142.50	16.60	14.35	182	124.00	140.10	16.10	14.16
133	122.80	138.10	15.30	13.59	183	123.20	139.20	16.00	13.67
134	122.00	137.60	15.60	13.95	184	122.10	137.40	15.30	13.78
135	122.70	138.40	15.70	13.96	185	125.60	141.50	15.90	13.78
136	124.50	140.60	16.10	14.01	186	123.00	136.70	13.70	12.15
137	123.20	138.00	14.80	13.10	187	123.40	139.10	15.70	13.87
138	125.30	140.90	15.60	13.55	188	126.40	142.50	16.10	13.86
139	124.70	140.70	16.00	13.97	189	123.40	139.20	15.80	13.96
140	123.20	138.30	15.10	13.36	190	123.30	139.20	15.90	14.06
141	123.70	139.70	16.00	14.10	191	122.40	138.40	16.00	14.26
142	124.90	140.30	15.40	13.43	192	123.40	139.30	15.90	14.05
143	123.00	138.20	15.20	13.48	193	123.60	139.20	15.60	13.76
144	120.50	136.00	15.50	14.05	194	124.10	139.70	15.60	13.70
145	126.50	143.00	16.50	14.19	195	122.30	137.60	15.30	13.65
146	125.20	141.40	16.20	14.09	196	121.60	137.10	15.50	13.91
147	125.70	142.30	16.60	14.37	197	122.80	138.80	16.00	14.21
148	123.80	138.90	15.80	13.25	198	124.70	140.80	16.10	14.06
149	124.60	140.20	15.60	13.64	199	122.50	138.50	16.00	14.25
150	125.20	140.70	15.50	13.48	200	123.70	139.20	15.50	13.66

TABLE NO. 2 - (CONTINUED)

PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
201	1	123.70	136.30	11.54
202	1	125.30	141.70	13.75
203	1	121.40	136.90	13.94
204	1	125.20	141.40	14.09
205	1	123.00	138.90	14.10
206	1	122.30	138.30	13.77
207	1	125.90	141.60	13.57
208	1	122.60	138.00	13.70
209	1	124.90	140.90	13.95
210	1	124.60	141.00	14.34
211	1	124.00	140.00	14.06
212	1	123.50	139.50	14.12
213	1	124.70	141.00	14.24
214	1	123.50	139.50	14.12
215	1	124.00	140.20	14.24
216	1	123.50	139.50	14.12
217	1	121.90	136.90	13.43
218	1	126.10	141.00	12.86
219	1	122.50	138.20	13.98
220	1	125.70	141.30	13.51
221	1	121.90	137.40	13.88
222	1	124.40	140.00	13.66
223	1	122.30	136.20	12.40
224	1	124.30	141.10	14.22
225	1	123.60	139.50	14.02
226	1	125.30	141.60	14.16
227	1	121.90	137.40	13.83
228	1	123.10	138.90	13.99
229	1	124.20	139.70	13.60
230	1	123.10	139.20	14.26
231	1	124.10	140.30	14.22
232	1	126.00	140.10	12.12
233	1	122.70	138.60	14.13
234	1	125.10	140.90	13.75
235	1	120.20	142.70	14.22
236	1	123.10	138.80	13.11
238	1	120.60	143.00	14.09
239	1	123.60	137.50	12.26
240	1	120.70	141.50	13.35
241	1	120.90	133.50	11.38
242	1	123.70	139.70	14.10
243	1	125.10	141.30	14.10
244	1	124.10	140.20	14.14

TABLE NO. 2 - COMPLETE LISTING OF THE 'PRODUCTION' POSITIVE PLATES.

PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	124.70	140.20	15.50	13.54	51	126.60	142.30	15.70	13.49
2	125.20	140.80	15.60	13.57	52	127.10	143.30	16.20	13.86
3	124.80	140.50	15.70	13.70	53	123.10	137.60	14.50	12.54
4	122.60	133.30	15.70	13.97	54	123.50	141.50	16.00	13.88
5	123.60	139.20	15.60	13.76	55	123.90	133.70	15.30	14.02
6	126.50	142.60	16.10	13.84	56	123.00	144.10	16.10	13.67
7	125.60	141.80	16.20	14.04	57	124.90	141.10	16.20	14.12
8	126.20	142.50	16.30	14.05	58	123.40	133.30	15.90	14.17
9	124.20	140.10	15.90	13.95	59	123.20	139.10	15.90	14.97
10	123.80	139.90	16.10	14.17	60	123.00	133.70	15.70	13.92
11	124.80	140.70	15.90	13.87	61	124.70	140.30	15.60	13.62
12	126.20	142.30	16.10	13.68	62	122.30	137.80	15.50	13.03
13	125.60	141.50	15.90	13.73	63	120.80	143.20	16.40	14.07
14	124.20	139.90	15.70	13.77	64	127.70	143.50	15.80	13.45
15	127.30	143.40	16.10	13.75	65	124.70	140.70	16.00	13.97
16	123.00	133.50	15.50	13.74	66	120.10	135.50	15.40	14.01
17	124.10	139.90	15.80	13.87	67	121.30	137.30	15.50	13.09
18	122.90	135.70	15.80	14.02	68	123.90	142.20	16.30	14.99
19	125.60	141.80	16.20	14.04	69	125.80	142.10	16.30	14.10
20	125.80	141.80	16.00	13.34	70	124.30	140.10	15.80	13.85
21	125.20	142.10	15.90	13.83	71	122.10	133.10	15.00	14.30
22	124.20	139.30	15.70	13.77	72	122.60	133.40	15.80	14.06
23	123.80	139.40	15.60	13.73	73	123.00	133.10	15.10	13.39
24	124.80	141.20	16.40	14.31	74	123.60	138.60	15.00	13.23
25	124.00	139.70	15.70	13.80	75	123.10	140.80	15.70	13.66
26	124.00	139.70	15.70	13.80	76	125.00	140.30	15.50	13.50
27	123.60	139.30	15.70	13.34	77	123.50	139.30	15.30	13.95
28	123.40	138.40	15.00	13.25	78	122.90	138.40	15.50	13.75
29	125.30	141.00	15.70	13.64	79	124.10	140.20	16.10	14.14
30	123.80	135.90	15.10	13.29	80	123.70	139.70	16.00	14.10
31	124.20	140.00	15.80	13.86	81	122.80	137.80	15.00	13.52
32	124.50	140.40	15.90	13.91	82	125.40	140.90	15.50	13.45
33	125.30	139.30	15.70	13.84	83	122.60	138.20	15.60	13.88
34	124.00	141.70	16.40	14.25	84	126.30	141.20	14.90	12.83
35	124.00	139.80	15.80	13.88	85	124.50	143.00	15.50	13.56
36	125.70	141.40	15.70	13.59	86	124.10	143.10	16.00	14.05
37	125.20	138.90	15.70	13.89	87	122.70	133.40	15.70	13.96
38	123.20	136.70	15.50	13.72	88	123.50	142.10	16.60	14.40
39	124.90	139.50	15.50	13.62	89	123.60	139.60	16.00	14.11
40	125.50	141.50	16.00	13.88	90	123.60	140.20	15.90	13.94
41	124.80	140.00	15.20	13.26	91	124.50	140.20	15.90	14.15
42	124.70	140.00	15.30	13.36	92	122.60	135.50	15.90	14.16
43	123.90	139.80	15.90	13.98	93	126.00	142.40	16.40	14.16
44	125.20	141.20	16.00	13.91	94	127.00	142.50	15.50	13.27
45	125.10	141.20	16.00	13.91	95	124.10	140.00	15.90	13.96
46	124.70	140.10	15.40	14.01	96	124.70	140.50	15.80	13.80
47	125.30	141.10	15.30	13.45	97	126.70	142.60	15.90	13.65
48	125.10	140.60	15.50	13.73	98	121.60	137.20	15.60	14.00
49	123.40	139.20	15.80	13.49	99	122.40	135.20	15.80	14.08
50	124.30	138.60	14.30	12.53	100	124.00	140.10	16.10	14.15

TABLE NO. 2 - (CONTINUED)

PLATE NO	SINTERED WT	FORNED WT	O2 (GH)	O2 PERCENT	PLATE NO	SINTERED WT	FORNED WT	O2 (GH)	O2 PERCENT
101	127.60	139.40	15.80	13.93	151	125.50	141.80	16.30	14.14
102	125.00	141.80	15.80	13.64	152	124.20	140.10	15.90	13.95
103	125.00	141.00	16.00	13.94	153	126.00	142.20	16.20	13.99
104	125.20	141.40	16.20	14.09	154	121.70	137.20	15.50	13.90
105	122.70	138.20	15.50	13.78	155	127.70	143.70	16.00	13.62
106	125.90	142.10	16.20	14.00	156	124.90	141.10	16.20	14.12
107	122.50	138.50	16.00	14.25	157	125.50	141.20	15.70	13.62
108	123.50	139.20	15.90	14.06	158	123.90	139.80	15.90	13.92
109	121.30	136.00	14.70	13.23	159	122.80	137.90	15.10	13.41
110	125.10	141.30	16.20	14.10	160	123.80	139.90	16.10	14.17
111	126.60	143.20	16.60	14.26	161	123.40	139.30	15.90	14.05
112	124.40	140.50	16.10	14.10	162	122.20	138.10	15.90	14.20
113	122.40	138.40	16.00	14.26	163	122.90	138.70	15.80	14.02
114	125.60	142.00	16.40	14.21	164	122.80	138.40	15.60	13.85
115	121.00	136.20	15.20	13.72	165	123.00	138.50	15.50	13.74
116	122.70	138.40	15.70	13.96	166	123.60	139.00	15.40	13.52
117	123.40	139.40	16.00	14.13	167	125.20	141.30	16.10	14.03
118	123.00	138.80	15.80	14.01	168	123.10	138.60	15.50	13.73
119	122.80	138.60	15.80	14.03	169	126.20	142.10	15.90	13.71
120	124.30	140.30	16.00	14.02	170	124.20	140.30	16.10	14.12
121	123.50	139.20	15.70	13.86	171	125.60	141.50	15.90	13.78
122	124.90	140.50	15.60	13.60	172	125.70	141.80	16.10	13.94
123	121.80	137.30	15.50	13.89	173	126.20	142.70	16.50	14.22
124	121.30	134.20	12.90	11.61	174	123.80	139.60	15.80	13.91
125	123.50	139.00	15.50	13.68	175	125.50	141.40	15.90	13.79
126	124.70	136.60	13.90	12.14	176	124.30	140.10	15.80	13.85
127	124.90	139.70	14.60	12.90	177	125.90	141.60	15.70	13.57
128	122.50	136.60	14.10	12.56	178	124.80	141.00	16.20	14.14
129	123.90	139.00	15.10	13.28	179	123.00	138.70	15.70	13.92
130	122.80	138.70	15.90	14.12	180	125.20	141.30	16.10	14.00
131	124.10	139.80	15.70	13.78	184	123.00	138.50	15.50	13.74
132	125.80	141.70	15.90	13.75	185	123.10	137.30	14.70	13.02
133	126.20	141.80	15.60	13.45	186	126.10	141.70	15.50	13.46
134	122.00	137.50	15.50	13.86	187	126.50	142.50	16.00	13.76
135	123.90	140.00	16.10	14.16	188	123.40	138.40	15.00	13.25
136	122.10	138.00	15.90	14.21	189	124.70	140.30	15.60	13.62
137	121.90	137.60	15.70	14.06	190	124.10	139.70	15.60	13.70
138	123.80	139.70	15.90	14.00	191	124.40	140.10	15.70	13.75
139	127.50	143.60	16.10	13.73	192	124.20	140.50	16.30	14.50
140	123.60	139.40	15.80	13.93	193	124.50	140.90	16.40	14.35
141	122.90	138.50	15.60	13.84	194	120.50	136.20	15.90	14.44
142	126.00	142.20	16.20	13.93	195	125.00	141.20	16.20	14.11
143	124.80	141.20	16.40	14.31	196	123.00	138.90	15.90	14.10
144	124.60	140.40	15.80	13.81	197	128.00	144.80	16.80	14.26
145	125.20	141.60	16.40	14.26	198	122.40	138.20	15.80	14.08
146	122.60	138.40	15.80	14.06	199	124.10	139.80	15.70	13.78
147	122.60	138.40	15.80	14.06	200	125.70	142.10	16.40	14.20
148	125.40	141.70	16.30	14.15					
149	123.30	138.60	15.30	13.53					
150	123.20	133.30	15.10	13.36					
	124.00	139.50	15.50	13.62					

TABLE NO. 3 'SPECIAL' POSITIVE PLATES ASSIGNED TO CELLS.

POSITIVE PLATE GROUPING									
CELL 1		BLOCK NO 0		FORM NO 00001		CELL 4		BLOCK NO 0	
POSITIVE PLATE GROUPING		FORM NO 00001		FORM NO 00001		FORM NO 00001		FORM NO 00001	
PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	125.90	142.50	16.60	14.35	1	126.50	143.00	16.50	14.19
2	122.80	138.80	16.00	14.21	2	123.20	139.20	16.00	14.16
3	123.70	139.70	16.00	14.10	3	124.90	140.90	16.00	13.95
4	123.90	139.70	15.80	13.90	4	124.20	140.00	15.80	13.86
5	125.10	140.90	15.80	13.75	5	123.40	139.10	15.70	13.87
6	123.80	139.30	15.50	13.64	6	122.60	133.10	15.50	13.79
7	122.90	138.40	15.50	13.75	7	124.70	140.20	15.50	13.54
8	124.80	139.70	14.80	13.00	8	124.10	139.00	14.90	13.08
9	123.20	138.00	14.80	13.10	9	124.80	139.50	14.70	12.93
TOTAL	1116.10	1257.00	140.90	123.80	TOTAL	1113.40	1259.00	140.60	123.27
AVG.	124.01	139.67	15.66	13.76	AVG.	124.27	139.89	15.62	13.70
SIGMA	1.059	1.366	0.562	0.463	SIGMA	1.149	1.420	0.559	0.467
THEO CAP	472.01 AH	EXPECTED CAP 415.38			THEO CAP	471.01 AH	EXPECTED CAP 414.49		
THICKNESS	IN				THICKNESS	IN			
POSITIVE PLATE GROUPING									
CELL 2		BLOCK NO 0		FORM NO 00001		CELL 5		BLOCK NO 0	
POSITIVE PLATE GROUPING		FORM NO 00001		FORM NO 00001		FORM NO 00001		FORM NO 00001	
PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	125.70	142.30	16.60	14.37	1	123.00	144.50	16.50	14.91
2	122.40	138.40	16.00	14.26	2	125.70	141.70	16.00	13.85
3	122.50	138.50	16.00	14.25	3	125.10	141.10	16.07	13.93
4	124.30	140.10	15.80	13.85	4	124.80	140.60	15.50	13.79
5	123.60	139.40	15.80	13.93	5	124.80	140.50	15.70	13.70
6	123.80	138.30	15.50	13.77	6	121.90	137.40	15.50	13.68
7	124.30	139.80	15.50	13.58	7	123.60	139.10	15.50	13.67
8	126.10	141.00	14.90	12.86	8	121.90	136.90	15.00	13.43
9	124.00	138.80	14.80	13.01	9	123.30	137.90	14.60	12.91
TOTAL	1115.70	1256.60	149.90	123.88	TOTAL	1119.10	1259.70	140.60	123.17
AVG.	123.97	139.62	15.66	13.76	AVG.	124.34	139.97	15.62	13.69
SIGMA	1.320	1.355	0.562	0.537	SIGMA	1.929	2.413	0.565	0.337
THEO CAP	472.01 AH	EXPECTED CAP 415.38			THEO CAP	471.01 AH	EXPECTED CAP 414.49		
THICKNESS	IN				THICKNESS	IN			
POSITIVE PLATE GROUPING									
CELL 3		BLOCK NO 0		FORM NO 00001		CELL 6		BLOCK NO 0	
POSITIVE PLATE GROUPING		FORM NO 00001		FORM NO 00001		FORM NO 00001		FORM NO 00001	
PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	126.50	143.00	16.50	14.19	1	126.20	142.70	16.50	14.22
2	124.50	140.50	16.00	14.00	2	125.70	141.70	16.00	13.85
3	123.60	139.60	16.00	14.11	3	124.90	140.00	16.00	14.06
4	125.10	140.90	15.80	13.75	4	125.40	141.20	15.80	13.72
5	124.20	140.00	15.80	13.66	5	121.60	137.30	15.70	14.09
6	124.20	139.70	15.50	13.60	6	122.70	138.20	15.50	13.78
7	123.20	138.70	15.50	13.72	7	126.30	141.80	15.50	13.35
8	125.10	140.00	14.90	12.97	8	125.20	140.20	15.00	13.04
9	123.20	138.00	14.80	13.10	9	122.30	136.90	14.60	13.02
TOTAL	1119.60	1260.40	140.80	123.30	TOTAL	1119.40	1260.00	140.60	123.13
AVG.	124.40	139.04	15.64	13.70	AVG.	124.38	140.00	15.62	13.68
SIGMA	1.063	1.418	0.541	0.423	SIGMA	1.783	2.094	0.565	0.447
THEO CAP	471.68 AH	EXPECTED CAP 415.08			THEO CAP	471.01 AH	EXPECTED CAP 414.49		
THICKNESS	IN				THICKNESS	IN			

TABLE NO. 3 (CONTINUED)

POSITIVE PLATE GROUPING BLOCK NO 0 FORM NO 00001											
CELL 7	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 10	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	131	123.50	139.90	16.40	14.47	1	238	126.60	143.00	16.40	14.09
2	106	124.20	140.20	16.00	14.04	2	37	125.10	141.10	16.00	13.93
3	212	123.50	139.50	16.00	14.12	3	53	126.50	142.50	16.00	13.76
4	228	123.10	138.90	15.80	13.99	4	72	124.00	139.80	15.80	13.88
5	164	122.80	138.50	15.70	13.94	5	62	123.10	138.80	15.70	13.91
6	203	121.40	136.90	15.50	13.94	6	221	121.90	137.40	15.50	13.88
7	150	125.20	140.70	15.50	13.48	7	142	124.90	140.30	15.40	13.43
8	5	124.70	139.70	15.00	13.10	8	84	122.00	137.10	15.10	13.51
9	115	124.60	139.10	14.50	12.67	9	81	124.20	138.50	14.30	12.54
TOTAL		1113.00	1253.40	140.40	123.75	TOTAL		1118.30	1258.50	140.20	122.93
AVG.		123.67	139.27	15.60	13.75	AVG.		124.26	139.83	15.58	13.66
SIGMA		1.169	1.120	0.570	0.563	SIGMA		1.725	2.100	0.612	0.469
THEO CAP	470.34 AH	EXPECTED CAP 413.90				THEO CAP	469.67 AH	EXPECTED CAP 413.31			
THICKNESS	IN					THICKNESS	IN				
POSITIVE PLATE GROUPING BLOCK NO 0 FORM NO 00001											
CELL 8	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 11	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	210	124.60	141.00	16.40	14.34	1	213	124.70	141.00	16.30	14.24
2	104	124.20	140.20	16.00	14.04	2	92	125.60	141.60	16.00	13.86
3	114	124.00	140.00	16.00	14.06	3	216	123.50	139.50	16.00	14.12
4	165	122.50	138.30	15.80	14.07	4	121	122.80	138.60	15.80	14.03
5	219	122.50	138.20	15.70	13.98	5	83	124.70	140.40	15.70	13.71
6	144	120.50	136.00	15.50	14.05	6	2	124.50	140.00	15.50	13.56
7	196	121.60	137.10	15.50	13.91	7	85	124.50	139.90	15.40	13.47
8	129	123.60	138.70	15.10	13.32	8	96	125.40	140.50	15.10	13.11
9	80	125.40	139.90	14.50	12.59	9	91	121.30	135.60	14.30	12.37
TOTAL		1108.90	1249.40	140.50	124.36	TOTAL		1117.00	1257.10	140.10	122.97
AVG.		123.21	138.82	15.61	13.82	AVG.		124.11	139.68	15.57	13.66
SIGMA		1.561	1.613	0.558	0.535	SIGMA		1.368	1.758	0.596	0.461
THEO CAP	470.67 AH	EXPECTED CAP 414.20				THEO CAP	469.33 AH	EXPECTED CAP 413.02			
THICKNESS	IN					THICKNESS	IN				
POSITIVE PLATE GROUPING BLOCK NO 0 FORM NO 00001											
CELL 9	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 12	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	17	126.00	142.40	16.40	14.16	1	224	124.80	141.10	16.30	14.22
2	40	124.30	140.30	16.00	14.02	2	244	124.10	140.20	16.10	14.14
3	214	123.50	139.50	16.00	14.12	3	125	125.10	141.10	16.00	13.93
4	163	122.90	138.70	15.80	14.02	4	189	123.40	139.20	15.80	13.96
5	124	122.00	137.70	15.70	14.04	5	88	124.60	140.30	15.70	13.72
6	200	123.70	139.20	15.50	13.66	6	99	120.20	135.70	15.50	14.09
7	43	123.60	139.10	15.50	13.67	7	87	124.50	139.90	15.40	13.47
8	118	122.20	137.30	15.10	13.48	8	148	123.80	138.90	15.10	13.29
9	13	125.70	140.20	14.50	12.55	9	173	125.50	139.80	14.30	12.40
TOTAL		1113.90	1254.40	140.50	123.72	TOTAL		1116.00	1256.20	140.20	123.22
AVG.		123.77	139.38	15.61	13.75	AVG.		124.00	139.53	15.58	13.69
SIGMA		1.391	1.519	0.558	0.508	SIGMA		1.566	1.638	0.606	0.575
THEO CAP	470.67 AH	EXPECTED CAP 414.20				THEO CAP	469.67 AH	EXPECTED CAP 413.31			
THICKNESS	IN					THICKNESS	IN				

TABLE NO. 3 (CONTINUED)

POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
00001		0		00001		0		00001	
CELL 13	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 16	PLATE NO	SINTERED WT	FORMED WT
1	226	125.30	141.60	16.30	14.16	1	97	127.90	144.10
2	36	125.20	141.30	16.10	14.00	2	94	126.40	142.50
3	57	124.50	140.50	16.00	14.00	3	77	125.20	141.20
4	71	125.10	140.90	15.80	13.75	4	122	124.20	140.10
5	103	123.30	139.00	15.70	13.88	5	179	122.70	138.40
6	56	123.30	138.90	15.60	13.79	6	102	122.70	138.30
7	29	125.10	140.50	15.40	13.40	7	208	122.60	138.00
8	140	123.20	138.30	15.10	13.36	8	169	124.80	140.00
9	26	124.20	138.40	14.20	12.46	9	223	122.30	136.20
TOTAL		1119.20	1259.40	140.20	122.80	TOTAL		1118.80	1258.30
AVG.		124.36	139.93	15.58	13.64	AVG.		124.31	139.87
SIGMA		0.890	1.288	0.632	0.519	SIGMA		1.953	2.457
THEO CAP	469.67 AH	EXPECTED CAP 413.31				THEO CAP	469.00 AH	EXPECTED CAP 412.72	
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
00001		0		00001		0		00001	
CELL 14	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 17	PLATE NO	SINTERED WT	FORMED WT
1	162	124.80	141.10	16.30	14.22	1	215	124.00	140.20
2	107	124.90	141.00	16.10	14.04	2	230	123.10	139.20
3	8	124.30	140.30	16.00	14.02	3	139	124.70	140.70
4	153	122.70	138.50	15.80	14.04	4	177	124.60	140.50
5	46	125.90	141.60	15.70	13.57	5	207	125.90	141.60
6	151	125.10	140.70	15.60	13.58	6	63	123.60	139.20
7	117	126.00	141.40	15.40	13.30	7	120	121.60	137.00
8	22	125.40	140.50	15.10	13.11	8	66	124.30	139.50
9	232	126.00	140.10	14.10	12.18	9	239	123.60	137.50
TOTAL		1125.10	1265.20	140.10	122.06	TOTAL		1115.40	1255.40
AVG.		125.01	140.58	15.57	13.56	AVG.		123.93	139.49
SIGMA		1.053	0.931	0.660	0.641	SIGMA		1.196	1.495
THEO CAP	469.33 AH	EXPECTED CAP 413.02				THEO CAP	469.00 AH	EXPECTED CAP 412.72	
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
00001		0		00001		0		00001	
CELL 15	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 18	PLATE NO	SINTERED WT	FORMED WT
1	108	124.70	141.00	16.30	14.24	1	59	126.00	142.20
2	31	124.70	140.80	16.10	14.06	2	136	124.50	140.60
3	64	124.40	140.40	16.00	14.01	3	242	123.70	139.70
4	16	121.20	137.00	15.80	14.23	4	205	123.00	138.90
5	10	123.80	139.50	15.70	13.82	5	236	123.10	138.80
6	149	124.60	140.20	15.60	13.64	6	82	122.50	138.10
7	68	124.40	139.80	15.40	13.49	7	21	122.50	137.90
8	11	125.60	140.70	15.10	13.08	8	78	126.10	141.30
9	65	125.90	139.90	14.00	12.10	9	105	121.30	135.20
TOTAL		1119.30	1259.30	140.00	122.67	TOTAL		1112.70	1252.70
AVG.		124.37	139.92	15.56	13.63	AVG.		123.63	139.19
SIGMA		1.346	1.205	0.688	0.686	SIGMA		1.627	2.085
THEO CAP	469.00 AH	EXPECTED CAP 412.72				THEO CAP	469.00 /H	EXPECTED CAP 412.72	
THICKNESS	IN					THICKNESS	IN		

TABLE NO. 3 (CONTINUED)

POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 19		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	110	1	125.60	141.80	16.20	146	1	125.20	16.20
2	90	1	125.20	141.30	16.10	119	1	125.70	16.10
3	141	1	123.70	139.70	16.00	100	1	121.50	15.90
4	95	1	123.00	138.90	15.90	55	1	125.00	15.90
5	155	1	124.30	140.50	15.70	135	1	122.70	15.70
6	39	1	123.40	139.00	15.60	159	1	123.10	15.60
7	67	1	126.20	141.50	15.30	184	1	122.10	15.30
8	143	1	123.00	138.20	15.20	49	1	124.60	15.20
9	38	1	123.50	137.20	13.70	25	1	124.40	13.60
TOTAL			1113.40	1258.10	139.70			1115.30	139.50
AVG.			124.27	139.79	15.52			123.92	15.50
SIGMA			1.205	1.598	0.764			1.632	0.787
THEO CAP	467.99 AH		EXPECTED CAP	411.84		THEO CAP	467.32 AH	EXPECTED CAP	411.25
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 20		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	231	1	124.10	140.30	16.20	243	1	125.10	16.20
2	12	1	123.40	139.50	16.10	112	1	126.40	16.10
3	14	1	124.30	140.80	16.00	185	1	125.60	15.90
4	202	1	125.80	141.70	15.90	161	1	121.70	15.90
5	156	1	124.90	140.60	15.70	193	1	123.60	15.60
6	54	1	124.00	139.60	15.60	75	1	124.40	15.60
7	33	1	125.20	140.50	15.30	116	1	125.00	15.30
8	13	1	122.60	137.80	15.20	123	1	123.20	15.20
9	186	1	123.00	136.70	13.70	19	1	124.80	13.40
TOTAL			1117.80	1257.50	139.70			1119.80	139.20
AVG.			124.20	139.72	15.52			124.42	15.47
SIGMA			1.068	1.569	0.764			1.410	0.846
THEO CAP	467.99 AH		EXPECTED CAP	411.84		THEO CAP	466.32 AH	EXPECTED CAP	410.37
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 21		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	204	1	125.20	141.40	16.20	42	1	124.60	16.10
2	128	1	123.40	139.50	16.10	198	1	124.70	16.10
3	20	1	125.00	140.90	15.90	76	1	123.50	15.90
4	233	1	122.70	138.60	15.90	93	1	125.70	15.90
5	160	1	123.50	139.20	15.70	194	1	124.10	15.60
6	138	1	125.30	140.90	15.60	6	1	121.50	15.60
7	195	1	122.30	137.60	15.30	133	1	122.80	15.30
8	28	1	121.60	136.80	15.20			125.90	15.30
9	27	1	123.80	137.50	13.70			123.70	13.10
TOTAL			1112.80	1252.40	139.60			1116.50	138.90
AVG.			123.64	139.16	15.51			124.06	15.43
SIGMA			1.324	1.672	0.757			1.388	0.926
THEO CAP	467.66 AH		EXPECTED CAP	411.55		THEO CAP	465.31 AH	EXPECTED CAP	409.48
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 22		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	146	1	125.20	141.40	16.20	146	1	125.20	16.20
2	119	1	125.70	142.80	16.10	119	1	125.70	16.10
3	100	1	121.50	137.40	15.90	100	1	121.50	15.90
4	55	1	125.00	140.90	15.90	55	1	125.00	15.90
5	135	1	122.70	138.40	15.70	135	1	122.70	15.70
6	159	1	123.10	138.70	15.60	159	1	123.10	15.60
7	184	1	122.10	137.40	15.30	184	1	122.10	15.30
8	49	1	124.60	139.80	15.20	49	1	124.60	15.20
9	25	1	124.40	138.00	13.60	25	1	124.40	13.60
TOTAL			1115.30	1254.80	139.50			1115.30	139.50
AVG.			123.92	139.42	15.50			123.92	15.50
SIGMA			1.632	1.919	0.787			1.632	0.787
THEO CAP	467.32 AH		EXPECTED CAP	411.25		THEO CAP	467.32 AH	EXPECTED CAP	411.25
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 23		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	243	1	125.10	141.30	16.20	243	1	125.10	16.20
2	112	1	126.40	142.50	16.10	112	1	126.40	16.10
3	185	1	125.60	141.50	15.90	185	1	125.60	15.90
4	161	1	121.70	137.60	15.90	161	1	121.70	15.90
5	193	1	123.60	139.20	15.60	193	1	123.60	15.60
6	75	1	124.40	140.00	15.60	75	1	124.40	15.60
7	116	1	125.00	140.30	15.30	116	1	125.00	15.30
8	123	1	123.20	138.40	15.20	123	1	123.20	15.20
9	19	1	124.80	138.20	13.40	19	1	124.80	13.40
TOTAL			1119.80	1259.00	139.20			1119.80	139.20
AVG.			124.42	139.89	15.47			124.42	15.47
SIGMA			1.410	1.676	0.846			1.410	0.846
THEO CAP	466.32 AH		EXPECTED CAP	410.37		THEO CAP	466.32 AH	EXPECTED CAP	410.37
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 24		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	42	1	124.60	140.70	16.10	42	1	124.60	16.10
2	198	1	124.70	140.80	16.10	198	1	124.70	16.10
3	76	1	123.50	139.40	15.90	76	1	123.50	15.90
4	93	1	125.70	141.60	15.90	93	1	125.70	15.90
5	194	1	124.10	139.70	15.60	194	1	124.10	15.60
6	6	1	121.50	137.10	15.60	6	1	121.50	15.60
7	133	1	122.80	138.10	15.30	133	1	122.80	15.30
8	60	1	125.90	141.20	15.30	60	1	125.90	15.30
9	201	1	123.70	136.80	13.10	201	1	123.70	13.10
TOTAL			1116.50	1255.40	138.90			1116.50	138.90
AVG.			124.06	139.49	15.43			124.06	15.43
SIGMA			1.388	1.786	0.926			1.388	0.926
THEO CAP	465.31 AH		EXPECTED CAP	409.48		THEO CAP	465.31 AH	EXPECTED CAP	409.48
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		O		FORM NO	
CELL 25		SINTERED WT		FORMED WT		SINTERED WT		FORMED WT	
PLATE NO						PLATE NO			
1	146	1	125.20	141.40	16.20	146	1	125.20	16.20
2	119	1	125.70	142.80	16.10	119	1	125.70	16.10
3	100	1	121.50	137.40	15.90	100	1	121.50	15.90
4	55	1	125.00	140.90	15.90	55	1	125.00	15.90
5	135	1	122.70	138.40	15.70	135	1	122.70	15.70
6	159	1	123.10	138.70	15.60	159	1	123.10	15.60
7	184	1	122.10	137.40	15.30	184	1	122.10	15.30
8	49	1	124.60	139.80	15.20	49	1	124.60	15.20
9	25	1	124.40	138.00	13.60	25	1	124.40	13.60
TOTAL			1115.30	1254.80	139.50			1115.30	139.50
AVG.			123.92	139.42	15.50			123.92	15.50
SIGMA			1.632	1.919	0.787			1.632	0.787
THEO CAP	467.32 AH		EXPECTED CAP	411.25		THEO CAP	467.32 AH	EXPECTED CAP	411.25
THICKNESS	IN					THICKNESS	IN		

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TABLE NO. 3 (CONTINUED)

POSITIVE PLATE GROUPING				
BLOCK NO 0 FORM NO 00001				
CELL 25	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)
1	171	125.20	141.30	16.10
2	188	126.40	142.50	16.10
3	190	123.30	139.20	15.90
4	225	123.60	139.50	15.90
5	220	125.70	141.30	15.60
6	154	122.00	137.60	15.60
7	176	123.90	139.20	15.30
8	41	123.70	139.00	15.30
9	241	120.90	133.50	12.60
TOTAL		1114.70	1253.10	138.40
AVG.		123.86	139.23	15.38
SIGMA		1.744	2.622	13.52
THEO CAP	463.64 AH			0.841
THICKNESS	IN	EXPECTED CAP	408.01	

POSITIVE PLATE GROUPING				
BLOCK NO 0 FORM NO 00001				
CELL 26	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)
1	181	126.40	142.50	16.10
2	182	124.00	140.10	16.10
3	152	123.80	139.70	15.90
4	192	123.40	139.30	15.90
5	222	124.40	140.00	15.60
6	34	123.60	139.20	15.60
7	51	123.00	143.30	15.30
8	178	120.60	135.90	15.30
9	70	124.50	136.50	12.00
TOTAL		1118.70	1256.50	137.80
AVG.		124.30	139.61	15.31
SIGMA		2.047	2.402	13.43
THEO CAP	461.63 AH			1.148
THICKNESS	IN	EXPECTED CAP	406.24	

TABLE NO. 4 - 'PRODUCTION' POSITIVE PLATES ASSIGNED TO CELLS.

POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		0		FORM NO	
BLOCK NO		O		FORM NO		0		FORM NO	
CELL 1	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 4	PLATE NO	SINTERED WT	FORMED WT
1	197	128.00	144.80	16.80	14.26	1	173	126.20	142.70
2	180	125.20	141.30	16.10	14.00	2	172	125.70	141.80
3	135	123.90	140.00	16.10	14.16	3	56	128.00	144.10
4	43	123.90	139.80	15.90	13.98	4	136	122.10	138.00
5	194	120.30	136.20	15.90	14.44	5	59	123.20	139.10
6	75	125.10	140.80	15.70	13.66	6	177	125.90	141.60
7	36	125.70	141.40	15.70	13.59	7	37	123.20	138.90
8	32	125.40	140.90	15.50	13.45	8	168	123.10	138.60
9	150	124.00	139.50	15.50	13.62	9	166	123.60	139.00
TOTAL		1121.50	1264.70	143.20	125.16	TOTAL		1121.00	1263.80
AVG.		124.61	140.52	15.91	13.91	AVG.		124.56	140.42
SIGMA		2.059	2.250	0.401	0.343	SIGMA		1.953	2.161
THEO CAP	479.72 AH	EXPECTED CAP	422.16			THEO CAP	478.38 AH	EXPECTED CAP	420.98
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		0		FORM NO	
BLOCK NO		O		FORM NO		0		FORM NO	
CELL 2	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 5	PLATE NO	SINTERED WT	FORMED WT
1	111	126.60	143.20	16.60	14.26	1	93	126.00	142.40
2	79	124.10	140.20	16.10	14.14	2	170	124.00	140.30
3	139	127.50	143.60	16.10	13.73	3	100	124.00	140.10
4	13	125.60	141.50	15.90	13.78	4	9	124.20	140.10
5	58	122.40	138.30	15.90	14.17	5	108	123.30	139.20
6	179	123.00	138.70	15.70	13.92	6	22	124.20	139.90
7	191	124.40	140.10	15.70	13.75	7	157	125.50	141.20
8	1	124.70	140.20	15.50	13.54	8	123	121.30	137.30
9	62	122.30	137.80	15.50	13.83	9	46	124.70	140.10
TOTAL		1120.60	1260.60	143.00	125.12	TOTAL		1117.90	1260.60
AVG.		124.51	140.40	15.89	13.90	AVG.		124.21	140.07
SIGMA		1.817	2.048	0.348	0.240	SIGMA		1.218	1.382
THEO CAP	479.05 AH	EXPECTED CAP	421.57			THEO CAP	478.04 AH	EXPECTED CAP	420.68
THICKNESS	IN					THICKNESS	IN		
POSITIVE PLATE GROUPING									
BLOCK NO		O		FORM NO		0		FORM NO	
BLOCK NO		O		FORM NO		0		FORM NO	
CELL 3	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 6	PLATE NO	SINTERED WT	FORMED WT
1	89	125.50	142.10	16.60	14.40	1	34	125.30	141.70
2	112	124.40	140.50	16.10	14.10	2	167	125.20	141.30
3	15	127.30	143.40	16.10	13.75	3	20	125.80	141.80
4	138	123.80	139.70	15.90	14.00	4	175	125.50	141.40
5	196	123.00	138.90	15.90	14.10	5	99	122.40	138.20
6	3	124.80	140.50	15.70	13.70	6	116	122.70	138.40
7	121	123.50	139.20	15.70	13.86	7	131	124.10	139.80
8	125	123.50	139.00	15.50	13.68	8	165	123.00	138.50
9	85	124.50	140.00	15.50	13.56	9	66	120.10	135.50
TOTAL		1120.30	1263.30	143.00	125.15	TOTAL		1114.10	1256.60
AVG.		124.48	140.37	15.89	13.91	AVG.		123.79	139.62
SIGMA		1.312	1.513	0.348	0.267	SIGMA		1.896	2.150
THEO CAP	479.05 AH	EXPECTED CAP	421.57			THEO CAP	477.37 AH	EXPECTED CAP	420.09
THICKNESS	IN					THICKNESS	IN		

TABLE NO. 4 - (CONTINUED)

POSITIVE PLATE GROUPING
BLOCK NO 0 FORM NO 00002

CELL 7	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 10	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	114	125.60	142.00	16.40	14.21	1	63	126.80	143.20	16.40	14.07
2	160	123.30	139.90	16.10	14.17	2	10	123.80	139.90	16.10	14.17
3	155	127.70	143.70	16.00	13.62	3	113	122.40	138.40	16.00	14.26
4	132	125.80	141.70	15.90	13.75	4	97	126.70	142.60	15.90	13.65
5	77	123.50	139.30	15.80	13.95	5	102	126.00	141.80	15.80	13.64
6	33	123.60	139.30	15.70	13.84	6	4	122.60	138.30	15.70	13.97
7	25	124.00	139.70	15.70	13.80	7	199	124.10	139.30	15.70	13.78
8	94	127.00	142.50	15.50	13.27	8	78	122.90	138.40	15.50	13.75
9	148	123.30	138.60	15.30	13.53	9	41	124.30	140.00	15.20	13.25
TOTAL		1124.30	1266.70	142.40	124.14	TOTAL		1120.10	1262.40	142.30	124.55
AVG.		124.92	140.74	15.82	13.79	AVG.		124.46	140.27	15.81	13.84
SIGMA		1.655	1.768	0.327	0.300	SIGMA		1.722	1.864	0.348	0.312
THEO CAP	477.04 AH	EXPECTED CAP	419.80			THEO CAP	476.70 AH	EXPECTED CAP	419.50		
THICKNESS	IN					THICKNESS	IN				

POSITIVE PLATE GROUPING
BLOCK NO 0 FORM NO 00002

CELL 8	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 11	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	145	124.80	141.20	16.40	14.31	1	193	124.50	140.90	16.40	14.35
2	45	125.10	141.20	16.10	14.01	2	6	126.50	142.60	16.10	13.84
3	30	123.70	139.70	16.00	14.10	3	40	125.50	141.50	16.00	13.58
4	130	122.80	138.70	15.90	14.12	4	169	126.20	142.10	15.90	13.71
5	101	123.60	139.40	15.80	13.93	5	47	125.30	141.10	15.80	13.73
6	51	126.60	142.30	15.70	13.49	6	29	125.30	141.00	15.70	13.64
7	26	124.00	139.70	15.70	13.80	7	137	121.90	137.00	15.70	14.06
8	48	125.10	140.60	15.50	13.49	8	67	121.80	137.30	15.50	13.89
9	42	124.70	140.00	15.30	13.36	9	30	123.80	138.90	15.10	13.29
TOTAL		1120.40	1262.80	142.40	124.61	TOTAL		1120.80	1263.00	142.20	124.39
AVG.		124.49	140.31	15.82	13.85	AVG.		124.53	140.33	15.80	13.82
SIGMA		1.109	1.116	0.327	0.332	SIGMA		1.723	1.927	0.371	0.292
THEO CAP	477.04 AH	EXPECTED CAP	419.30			THEO CAP	476.37 AH	EXPECTED CAP	419.21		
THICKNESS	IN					THICKNESS	IN				

POSITIVE PLATE GROUPING
BLOCK NO 0 FORM NO 00002

CELL 9	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 12	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	145	125.20	141.60	16.40	14.26	1	24	124.80	141.20	16.40	14.51
2	12	126.20	142.30	16.10	13.38	2	57	124.90	141.10	16.20	14.12
3	36	124.10	140.10	16.00	14.05	3	117	123.40	139.40	16.00	14.13
4	171	125.60	141.50	15.90	13.78	4	95	124.10	140.90	15.90	13.96
5	163	122.90	138.70	15.80	14.02	5	49	123.40	139.20	15.80	13.96
6	14	124.20	139.90	15.70	13.77	6	27	123.60	139.30	15.70	13.84
7	37	122.70	138.40	15.70	13.96	7	98	121.60	137.20	15.60	14.00
8	105	122.70	138.20	15.50	13.78	8	184	123.00	138.50	15.50	13.74
9	115	121.00	136.20	15.20	13.72	9	149	123.20	138.30	15.10	13.36
TOTAL		1114.60	1256.90	142.30	125.22	TOTAL		1112.00	1254.20	142.20	125.42
AVG.		123.84	139.66	15.81	13.91	AVG.		123.56	139.36	15.80	13.94
SIGMA		1.669	1.969	0.348	0.176	SIGMA		1.002	1.298	0.387	0.273
THEO CAP	476.70 AH	EXPECTED CAP	419.50			THEO CAP	476.37 AH	EXPECTED CAP	419.21		
THICKNESS	IN					THICKNESS	IN				

TABLE NO. 4 - (CONTINUED)

POSITIVE PLATE GROUPING											
BLOCK NO 0 FORM NO 00002						BLOCK NO 0 FORM NO 00002					
CELL 13	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 16	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	230	125.70	142.10	16.40	14.20	1	192	124.20	140.50	16.30	14.30
2	142	125.00	142.20	16.20	13.99	2	19	125.60	141.80	16.20	14.04
3	120	124.30	140.30	16.00	14.02	3	137	126.50	142.50	16.00	13.76
4	162	122.20	138.10	15.90	14.20	4	158	123.90	139.80	15.90	13.98
5	31	124.20	140.00	15.80	13.86	5	174	123.80	139.60	15.80	13.91
6	60	123.00	138.70	15.70	13.92	6	118	123.00	138.80	15.80	14.01
7	189	124.70	140.30	15.60	13.62	7	5	123.60	139.20	15.60	13.75
8	76	125.00	140.50	15.50	13.50	8	38	123.20	139.70	15.50	13.72
9	73	123.00	138.10	15.10	13.39	9	31	122.80	137.80	15.00	13.32
TOTAL		1113.10	1260.30	142.20	124.70	TOTAL		1116.60	1258.70	142.10	124.80
AVG.		124.23	140.03	15.80	13.86	AVG.		124.07	139.86	15.79	13.87
SIGMA		1.291	1.528	0.387	0.293	SIGMA		1.251	1.516	0.392	0.273
THEO CAP	476.37 AH	EXPECTED CAP 419.21				THEO CAP	476.03 AH	EXPECTED CAP 418.91			
THICKNESS	IN					THICKNESS	IN				
POSITIVE PLATE GROUPING											
BLOCK NO 0 FORM NO 00002						BLOCK NO 0 FORM NO 00002					
CELL 14	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 17	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	151	125.50	141.80	16.30	14.14	1	68	125.90	142.20	16.30	14.09
2	195	125.00	141.20	16.20	14.11	2	178	124.80	141.00	16.20	14.14
3	90	125.60	139.60	16.00	14.11	3	54	125.50	141.50	16.00	13.98
4	161	123.40	139.30	15.90	14.05	4	92	122.60	138.50	15.80	14.15
5	140	123.60	139.40	15.80	13.93	5	17	124.10	139.90	15.80	13.87
6	119	122.80	138.60	15.60	14.03	6	72	122.60	138.40	15.80	14.06
7	190	124.10	139.70	15.60	13.70	7	122	124.90	140.50	15.60	13.60
8	16	125.00	138.50	15.50	13.74	8	154	121.70	137.20	15.50	13.90
9	159	122.80	137.90	15.10	13.41	9	28	123.40	138.40	15.00	13.25
TOTAL		1113.80	1256.00	142.20	125.22	TOTAL		1115.50	1257.60	142.10	124.94
AVG.		123.76	139.56	15.80	13.91	AVG.		123.94	139.73	15.79	13.88
SIGMA		0.958	1.256	0.368	0.288	SIGMA		1.454	1.693	0.392	0.294
THEO CAP	476.37 AH	EXPECTED CAP 419.21				THEO CAP	476.03 AH	EXPECTED CAP 418.91			
THICKNESS	IN					THICKNESS	IN				
POSITIVE PLATE GROUPING											
BLOCK NO 0 FORM NO 00002						BLOCK NO 0 FORM NO 00002					
CELL 15	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT	CELL 18	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	8	126.20	142.50	16.30	14.05	1	69	125.80	142.10	16.30	14.10
2	52	127.10	143.30	16.20	13.86	2	110	125.10	141.30	16.20	14.10
3	65	124.70	140.70	16.00	13.97	3	103	125.00	141.00	16.00	13.94
4	32	124.50	140.40	15.90	13.91	4	91	124.30	140.20	15.90	13.94
5	64	127.70	143.50	15.80	13.45	5	176	124.30	140.10	15.80	13.85
6	198	122.40	138.20	15.80	14.08	6	96	124.70	140.50	15.80	13.80
7	2	125.20	140.80	15.60	13.57	7	23	123.80	139.40	15.60	13.73
8	39	124.00	139.50	15.50	13.62	8	134	122.00	137.50	15.50	13.86
9	129	123.90	139.00	15.10	13.28	9	74	123.60	138.60	15.00	13.23
TOTAL		1125.70	1267.90	142.20	123.79	TOTAL		1118.60	1260.70	142.10	124.55
AVG.		125.08	140.88	15.80	13.75	AVG.		124.29	140.08	15.79	13.84
SIGMA		1.677	1.882	0.368	0.284	SIGMA		1.095	1.414	0.392	0.260
THEO CAP	476.37 AH	EXPECTED CAP 419.21				THEO CAP	476.03 AH	EXPECTED CAP 418.91			
THICKNESS	IN					THICKNESS	IN				

TABLE NO. 4 - (CONTINUED)

POSITIVE PLATE GROUPING
BLOCK NO 0 FORM NO 00002

CELL 19	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	147	125.40	141.70	16.30	14.15
2	156	124.90	141.10	16.20	14.12
3	44	125.20	141.20	16.00	13.91
4	11	124.80	140.70	15.90	13.87
5	144	124.60	140.40	15.80	13.81
6	35	124.00	139.80	15.80	13.88
7	61	124.70	140.30	15.60	13.62
8	136	126.10	141.70	15.60	13.46
9	188	123.40	138.40	15.00	13.25
TOTAL		1123.10	1265.30	142.20	124.07
AVG.		124.79	140.59	15.80	13.79
SIGMA		0.786	1.044	0.384	0.295
THEO CAP THICKNESS	476.37 AH	EXPECTED CAP	419.21		

PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	PERCENT
185	123.10	137.80	14.70	13.02
109	121.30	136.00	14.70	13.23
53	123.10	137.60	14.50	12.84
50	124.30	138.60	14.30	12.53
128	122.50	136.60	14.10	12.56
126	124.70	138.60	13.90	12.14
124	121.30	134.20	12.90	11.61

POSITIVE PLATE GROUPING
BLOCK NO 0 FORM NO 00002

CELL 20	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	7	125.60	141.80	16.20	14.04
2	153	126.00	142.20	16.20	13.99
3	71	122.10	138.10	16.00	14.30
4	152	124.20	140.10	15.90	13.95
5	55	122.90	138.70	15.80	14.02
6	70	124.30	140.10	15.80	13.85
7	164	122.80	138.40	15.60	13.85
8	133	126.20	141.20	15.60	13.45
9	84	126.30	141.20	14.90	12.83
TOTAL		1120.40	1262.40	142.00	124.28
AVG.		124.49	140.27	15.78	13.81
SIGMA		1.620	1.532	0.396	0.451
THEO CAP THICKNESS	475.70 AH	EXPECTED CAP	418.62		

POSITIVE PLATE GROUPING
BLOCK NO 0 FORM NO 00002

CELL 21	PLATE NO	SINTERED WT	FORMED WT	O2 (GM)	O2 PERCENT
1	104	125.20	141.40	16.20	14.09
2	106	125.90	142.10	16.20	14.00
3	107	122.50	133.50	16.00	14.25
4	21	125.20	141.10	15.90	13.83
5	146	122.60	133.40	15.80	14.06
6	18	122.90	133.70	15.80	14.02
7	141	122.90	133.50	15.60	13.84
8	83	122.60	138.20	15.60	13.88
9	127	124.90	139.70	14.80	12.90
TOTAL		1114.70	1256.60	141.90	124.87
AVG.		123.86	139.62	15.77	13.87
SIGMA		1.403	1.518	0.425	0.589
THEO CAP THICKNESS	475.36 AH	EXPECTED CAP	418.33		

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE NO. 5 - TOTAL GAS ACCUMULATED DURING OPEN CIRCUIT STAND FOR CELLS.
NOTE, ** LEAK DEVELOPED IN COLLECTING SYSTEM. VOLUME IN CC.

TIME HRS	CELLS				CELLS				CELLS			
	S-1	S-5	S-10	S-15	S-21	P-1	P-5	P-10	P-15	P-20		
16.2	97.8	11.4	10.3	59.5	14.0	15.2	41.9	19.6	16.8	-0.0		
27.7	164.0	26.2	20.0	96.0	30.0	30.2	75.3	39.1	31.6	3.0		
39.7	259.5	36.5	23.1	130.8	40.0	37.1	105.1	56.5	42.2	4.0		
50.9	308.0	48.4	30.0	153.2	54.7	54.7	140.7	73.3	54.8	7.8		
64.4	462.0	68.4	40.3	193.8	36.4	62.2	202.1	117.0	81.8	12.5		
74.0	465.3	90.6	56.5	224.0	120.0	77.5	244.1	133.5	112.0	18.8		
85.3	572.3	125.0	71.3	269.3	161.5	99.5	313.9	176.4	156.5	22.2		
98.4	632.0	157.2	83.0	297.0	165.0	113.3	359.3	203.2	163.0	27.5		
134.9	856.7	*****	139.6	361.2	265.4	157.6	494.1	265.6	286.4	35.6		
147.4	907.4	*****	143.5	374.5	278.0	180.4	513.3	273.5	305.5	39.6		
157.4	923.5	*****	152.4	379.8	282.0	189.2	529.3	279.0	312.0	39.9		
180.6	991.6	*****	172.6	405.4	297.0	218.3	563.6	295.0	342.8	42.8		
183.9	1037.5	*****	201.4	449.0	342.6	292.3	654.1	332.3	359.0	54.2		
207.9	1241.5	321.7	231.4	496.6	335.7	338.3	721.6	372.3	499.8	72.0		
215.5	1282.3	350.2	257.9	509.0	396.0	420.0	743.1	384.2	420.9	77.2		

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE NO. 6 - TIMES AND VOLUME (CC) OF OXYGEN MEASURED DURING OPEN CIRCUIT STAND OF THE CELLS. TOTAL OXYGEN ACCUMULATED IS SHOWN.

	TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	TOT. OXY.
S-1	27.7	1.31*20.0	0.57*74.0	0.50*120.2	0.77*147.4	0.41*183.9	0.52*207.9	6.29
S-5	30.4	1.57*215.5	1.52*					5.49
S-10	147.4	1.30*215.5	1.64*					3.54
S-15	27.7	1.20*74.4	1.05*147.4					4.36
S-21	36.4	2.31*150.6	1.13*215.5	1.02*				4.52
P-1	120.2	1.35*135.9	1.11*215.5	0.64*				3.10
P-5	40.7	1.07*74.7	0.73*93.4	0.92*147.4				5.66
P-10	74.4	0.33*147.4	0.42*215.5	0.46*		1.04*		1.72
P-15	96.4	0.38*207.9	0.39*215.5	0.00*				1.37
P-20	245.5	0.49*						6.93

TABLE NO. 7. - TOTAL GAS (OXYGEN PLUS HYDROGEN) PRODUCED DURING DISCHARGE OF CELLS (ACCUMULATED). SHOWS ALSO IS GAS FORMED FOR A TIME OF 60. HRS FROM START. VOLUME IN CC.

S-1	S-5	S-10	S-15	S-21	P-1	P-5	P-10	P-15	P-20
TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME
-3.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00
6.60	124.00-6.60	39.30-6.60	61.30-6.60	69.20-6.60	70.70-6.60	104.00-6.60	84.70-6.60	59.30-6.60	51.60-6.60
15.50	275.00-15.50	195.20-15.50	123.50-15.50	139.20-15.50	149.00-15.50	114.50-15.50	109.00-15.50	120.10-15.50	101.80-15.50
15.80	279.20-16.20	201.00-16.30	123.80-16.30	146.50-16.70	152.00-16.90	131.00-17.10	125.50-17.30	125.20-17.50	109.80-17.60
24.50	443.20-24.72	309.80-24.83	180.00-24.85	217.70-24.87	223.50-24.92	242.20-25.08	233.50-25.22	170.60-25.23	154.60-25.25
35.70	570.20-35.90	394.10-36.00	221.30-36.40	273.20-36.50	286.50-36.70	333.40-36.80	332.00-37.10	215.20-37.20	193.00-37.40
41.00	610.40-41.00	422.90-41.00	232.90-41.00	255.20-41.00	303.30-41.00	360.60-41.00	356.20-41.00	229.10-41.00	207.80-41.00
41.82	620.40-41.78	425.20-41.95	239.60-42.08	296.50-42.15	303.30-42.15	371.00-42.15	366.00-42.53	229.10-42.53	209.20-42.77

S-1	S-5	S-10	S-15	S-21	P-1	P-5	P-10	P-15	P-20
TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME
60.00	90.00-60.00	45.80-60.00	0.00-60.00	12.00-60.00	0.00-60.00	38.40-60.00	35.40-60.00	0.00-60.00	0.00-60.00

TABLE NO. 8-TIMES AND OXYGEN VOLUME(CC) FOR EACH CELL DURING DISCHARGE. TOTAL ACCUMULATED IS ALSO SHOWN.

TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	VOL.*TIME	TOT. OXY.
S-1	6.60	2.85-15.80	3.72-24.53	0.40-35.70	0.39*
S-5	6.60	2.17-16.20	0.64-24.72	0.23*	7.45
S-10	16.30	7.90-36.00	3.14*		5.04
S-15	16.50	5.52-36.40	2.15*		11.04
S-21	16.70	4.57-36.50	0.53*		7.67
P-1	6.60	1.23-16.90	1.05-24.92	0.23-36.70	5.10
P-5	6.60	3.00-17.10	1.13-25.08	0.14*	2.64
P-10	17.30	6.25-37.10	1.55*	0.11-36.80	4.58
P-15	17.50	4.84-37.20	1.32*		7.80
P-20	17.60	2.57-37.40	0.61*		6.16
					3.18

TABLE NO. 9. - VOLTAGES DURING DISCHARGE FOR THE CELLS ARE SHOWN TO 1.00 VOLT.
THE OPEN CIRCUIT VOLTAGES ARE SHOWN AFTER DISCHARGE IS COMPLETED.
THE CELL CAPACITIES ARE SHOWN FOR 1.00 VOLT AND 1.40 VOLT CUT-OFF.

TIME HRS	S-1	CELLS S-5	S-10	S-15	CELLS S-21	P-1	P-5	CELLS P-10	P-15	P-20
37.05	1.59	1.59	1.59	1.59	1.58	1.59	1.58	1.59	1.59	1.58
37.62	1.57	1.57	1.58	1.58	1.57	1.58	1.57	1.58	1.58	1.57
38.62	1.57	1.57	1.57	1.57	1.56	1.57	1.57	1.57	1.57	1.56
39.05	1.56	1.55	1.57	1.57	1.56	1.57	1.57	1.57	1.57	1.55
40.05	1.52	1.53	1.53	1.53	1.52	1.55	1.55	1.55	1.56	1.53
40.55	1.50	1.49	1.52	1.51	1.50	1.55	1.53	1.53	1.55	1.51
40.97	1.45	1.45	1.50	1.48	1.45	1.53	1.52	1.51	1.53	1.49
41.12	1.41	1.41	1.47	1.45	1.41	1.51	1.50	1.50	1.52	1.48
41.22	1.39	1.39	1.47	1.45	1.39	1.51	1.50	1.50	1.52	1.47
41.37	1.35	1.35	1.43	1.41	1.35	1.50	1.50	1.49	1.51	1.46
41.55	1.25	1.25	1.39	1.38	1.26	1.49	1.49	1.47	1.51	1.44
41.72	1.17	1.13	1.31	1.33	1.27	1.49	1.47	1.45	1.50	1.42
41.87	1.05*****		1.26	1.23	1.06	1.47	1.46	1.42	1.49	1.39
42.05*****				1.13*****		1.47	1.45	1.39	1.48	1.35
42.22*****						1.43	1.42	1.33	1.45	1.30
42.37*****						1.41	1.38	1.22	1.42	1.24
42.62*****						1.33	1.31*****		1.35	1.19
42.80*****						1.26	1.23*****		1.28	1.06
42.97*****						1.15	1.14*****		1.17*****	
43.12*****						1.08*****				

OPEN CIRCUIT VOLTAGES AFTER DISCHARGE AT 60. HRS

S-1 = 1.58, S-5 = 1.58, S-10 = 1.58, S-15 = 1.58, S-21 = 1.58,
P-1 = 1.58, P-5 = 1.58, P-10 = 1.58, P-15 = 1.59, P-20 = 1.60

CELL CAPACITIES

S-1 1.00 VOLT CUT-OFF=41.30 HRS, 1.40 VOLT CUT-OFF=40.92 HRS.
S-5 1.00 VOLT CUT-OFF=41.78 HRS, 1.40 VOLT CUT-OFF=40.92 HRS
S-10 1.00 VOLT CUT-OFF=41.95 HRS, 1.40 VOLT CUT-OFF=41.25 HRS
S-15 1.00 VOLT CUT-OFF=42.08 HRS, 1.40 VOLT CUT-OFF=41.17 HRS
S-21 1.00 VOLT CUT-OFF=41.35 HRS, 1.40 VOLT CUT-OFF=40.92 HRS
P-1 1.00 VOLT CUT-OFF=43.12 HRS, 1.40 VOLT CUT-OFF=42.03 HRS
P-5 1.00 VOLT CUT-OFF=43.03 HRS, 1.40 VOLT CUT-OFF=42.09 HRS
P-10 1.00 VOLT CUT-OFF=42.53 HRS, 1.40 VOLT CUT-OFF=41.67 HRS
P-15 1.00 VOLT CUT-OFF=43.08 HRS, 1.40 VOLT CUT-OFF=42.17 HRS
P-20 1.00 VOLT CUT-OFF=42.77 HRS, 1.40 VOLT CUT-OFF=41.41 HRS

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TABLE NO. 10. OPEN CIRCUIT GAS ACCUMULATED FOR THE PLATES ON TEST. VOLUME IN CC.

TIME	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13
-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
13.50	0.62	0.53	0.80	0.73	1.39	1.27	0.37	0.58	1.34	0.55	1.17	1.49	1.46
20.30	0.90	0.99	1.32	1.15	2.51	1.89	0.49	0.86	1.77	0.80	1.56	1.81	1.89
24.00	1.07	1.15	1.56	1.34	2.84	2.18	0.58	1.01	1.99	0.95	1.75	2.03	2.10
36.40	1.64	1.97	2.53	2.01	3.90	3.19	0.90	1.54	2.79	1.38	2.38	2.73	2.82
44.40	2.35	2.59	3.15	2.47	4.64	4.09	1.67	1.83	3.33	1.75	2.77	3.19	3.27
60.50	2.88	3.74	4.42	3.33	5.96	5.32	1.62	2.36	4.19	2.30	3.47	3.97	4.05
70.00	3.33	4.40	5.10	3.73	6.72	5.98	1.93	2.67	4.64	2.65	3.34	4.38	4.50
85.75	3.74	5.22	5.96	4.27	7.56	6.66	2.30	2.96	5.16	3.02	4.21	4.79	4.91
97.65	4.15	5.84	6.56	4.69	8.20	7.17	2.59	3.19	5.55	3.27	4.48	5.12	5.23
109.45	4.40	6.29	7.04	4.97	8.71	7.53	2.79	3.35	5.83	3.43	4.60	5.49	5.49
120.45	4.60	6.66	7.50	5.22	9.17	7.95	2.96	3.49	6.12	3.60	4.85	5.61	5.59
134.30	4.97	7.27	8.08	5.55	9.78	8.49	3.21	3.64	6.15	3.80	5.08	5.92	6.00
143.55	5.43	7.81	8.61	5.88	10.32	8.94	3.41	3.84	6.1	4.01	5.28	6.23	6.27
157.80	5.92	8.22	9.35	6.33	11.10	9.60	3.74	4.01	7.19	4.29	5.59	6.64	6.64

TABLE NO. 11. - GAS ACCUMULATED FOR THE PLATED DURING DISCHARGE (CC).

TIME	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13
-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
8.20	1.93	1.27	2.01	1.73	2.67	2.05	1.34	1.40	1.81	1.11	1.89	3.16	2.14
22.30	3.82	3.45	4.36	4.19	6.45	6.29	3.12	3.62	4.11	2.51	4.15	5.47	5.19
27.55	4.64	4.11	5.03	5.18	7.40	7.77	3.78	4.56	4.91	3.00	5.01	6.33	6.21
32.20	5.51	4.44	5.65	5.80	8.10	8.84	4.27	5.38	5.49	3.21	5.00	7.70	7.03
45.00	8.51	5.67	7.38	7.77	10.48	11.34	6.21	8.55	7.59	4.19	8.22	12.25	8.71
47.00	8.75	5.89	7.50	7.89	10.69	11.47	6.37	-0.00	7.71	4.23	8.34	12.54	8.54
48.00	9.04	5.88	7.62	8.01	10.97	11.63	-0.00	-0.00	7.83	4.32	8.55	12.36	8.96
49.00	9.17	6.00	7.79	8.14	11.22	11.75	-0.00	-0.00	7.95	4.36	8.67	13.19	9.04
50.00	-0.00	6.08	7.91	8.26	11.63	11.92	-0.00	-0.00	8.08	-0.00	8.89	-0.00	9.17
51.00	-0.00	6.33	8.12	8.51	-0.00	12.17	-0.00	-0.00	-0.00	-0.50	9.12	-0.00	9.33
53.00	-0.00	6.37	8.16	8.63	-0.00	12.25	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
54.00	-0.00	-0.00	-0.00	8.71	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
CAP. HRS.	49.4	53.1	53.2	54.3	51.9	53.9	48.0	46.0	51.5	49.9	52.5	49.0	53.0

TABLE NO. 12. - PLATE GAS RESPONSES (O.C. CC AT 140 HOURS AND DISCH. CC. AT 50 HRS.

RESP	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13
O.C.	5.28	7.47	7.39	5.79	10.10	8.77	3.33	3.76	6.62	3.96	5.19	6.11	6.16
DIS.	9.70	6.10	7.39	8.28	11.53	11.91	6.90	9.34	8.10	4.46	8.86	13.00	9.18

TABLE NO. 13. - OPEN CIRCUIT (140 HRS.), DISCHARGE (50. HRS.) RESPONSES AND THE
TOTAL OXYGEN PRODUCED ON DISCHARGE FROM CELLS. VOLUME IN CC.

CELL NO.	U.C. RESP.	DIS. RESP.	DIS. TOTAL
S-1	4.05	7.97	7.45
S-5	2.29	3.76	5.04
S-10	2.31	12.62	11.04
S-15	2.85	9.17	7.67
S-21	2.94	5.50	5.10
P-1	2.02	2.80	2.64
P-5	3.69	4.91	4.58
P-10	1.12	8.80	7.80
P-15	1.22	7.01	6.16
P-20	0.65	3.58	3.18

REPRODUCIBILITY OF THE
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TABLE NO. 14 PLATE ASSIGNMENT FOR PLATE TESTING (PARA. 2.1F)

FIRST GROUP		SECOND GROUP	
ORIG. CELL NO.	PL. S/N TEST NO.	ORIG. CELL NO.	PL. S/N TEST NO.
2	199	2	174
2	127	2	206
2	3	2	218
2	69	8	104
8	114	8	165
8	219	8	144
8	196	8	129
14	162	14	107
14	8	14	46
14	151	14	117
14	22	20	231
20	14	20	202
20	156	20	54
20	33	26	182
26	152	26	192
			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15

TABLE NO. 15 - PHASE B GAS ACCUMULATION FOR PLATES OF THE FIRST GROUP
DURING DISCHARGE (CC.) AT 40 DEG. F. 2.6 AMP.

TIME	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13	PL=14	PL=15
0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
2.00	1.75	2.30	2.58	1.75	3.12	1.56	1.66	1.27	1.73	2.12	3.86	1.46	1.27	2.14	1.19
5.00	2.47	3.12	3.31	2.47	4.52	2.19	2.34	1.85	2.47	3.12	5.47	2.10	2.30	2.88	1.73
5.50	4.55	5.14	5.90	4.61	8.39	4.11	4.40	3.62	4.65	5.55	9.54	3.85	5.85	5.18	3.09
7.75	9.22	8.89	10.92	8.56	11.56	7.78	8.31	6.83	8.44	10.12	12.50	7.04	6.71	9.42	5.31
11.00	10.04	14.40	18.61	14.65	18.06	13.25	14.24	11.69	13.95	16.66	18.72	11.65	11.07	14.36	10.98
15.00	15.05	16.67	22.60	17.65	22.58	19.69	17.20	14.28	21.50	19.62	23.45	13.87	13.21	17.52	12.39
15.60	16.42	19.18	27.13	21.15	27.56	19.14	20.53	17.25	29.78	25.00	26.88	16.38	16.19	20.74	15.97
16.50	16.92	19.26	27.63	21.65	28.14	19.72	21.16	17.99	31.35	25.42	29.37	16.72	16.39	21.03	15.24
17.00	17.75	19.56	28.50	22.45	29.13	20.58	22.15	19.11	33.78	24.15	31.48	17.50	16.97	21.69	15.74
17.60	18.95	20.10	29.86	23.75	30.62	21.78	23.47	20.43	37.05	25.29	33.66	18.12	17.88	22.69	16.52
18.10	20.45	20.80	31.55	25.36	32.51	23.23	25.12	22.03	41.06	26.76	36.34	19.16	19.75	24.01	17.55
19.10	22.74	21.96	34.18	27.96	35.27	25.29	27.50	24.26	46.78	28.94	40.12	20.68	20.76	25.98	19.12
20.10	25.74	23.40	37.56	31.21	38.85	27.92	30.43	27.14	54.10	31.83	44.81	22.62	23.07	28.41	20.81
21.00	29.48	25.63	41.47	-0.00	43.13	33.01	33.76	36.84	55.38	35.23	-0.63	24.97	25.27	31.17	23.46
22.00	33.60	26.99	-0.00	-0.00	45.55	-0.00	-0.00	34.47	57.97	-0.00	-0.90	27.63	-0.00	-3.00	26.33

TABLE NO. 16 - PHASE B GAS ACCUMULATION FOR PLATES OF THE SECOND GROUP
DURING DISCHARGE (CC.) AT 40 DEG. F. 1. AMP.

TIME	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13	PL=14	PL=15
0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
3.20	2.67	1.56	0.66	0.99	3.21	2.22	0.66	1.73	1.23	0.30	0.95	0.78	2.51	0.82	1.05
5.55	4.48	2.42	1.15	1.69	5.01	3.45	1.11	2.53	1.97	1.43	1.50	1.36	3.82	1.60	1.75
8.50	7.15	5.53	3.81	2.59	7.19	5.22	1.77	3.90	2.96	2.26	2.51	2.22	5.38	2.22	2.65
13.50	11.27	9.06	5.01	3.77	10.85	7.75	2.80	5.64	4.24	3.40	3.87	3.46	7.53	3.36	3.87
18.10	15.45	5.11	5.39	6.13	13.18	12.81	4.86	9.09	6.79	5.66	6.59	5.97	11.85	5.68	4.38
23.00	25.81	5.75	6.76	7.45	22.13	15.53	6.10	10.95	8.19	6.94	8.15	7.45	13.91	6.82	7.70
27.00	31.13	12.64	9.14	8.62	28.67	20.14	8.36	14.12	10.66	9.25	10.33	10.91	17.53	8.96	16.09
30.00	39.56	16.05	11.99	12.38	36.40	25.57	11.08	17.90	13.63	11.90	14.00	13.95	21.81	11.49	12.93
42.80	44.13	18.03	15.59	14.02	46.31	26.62	13.02	20.21	15.15	13.70	15.94	14.70	24.07	12.85	14.78
48.60	51.45	21.16	16.39	16.58	46.52	33.43	15.94	25.91	17.67	16.41	18.90	17.34	27.74	15.08	17.55
51.50	53.00	21.56	17.10	17.03	47.88	36.30	16.69	24.78	18.17	16.37	19.56	17.84	28.23	15.45	18.57
52.80	55.32	22.94	18.05	17.70	49.78	35.58	17.59	26.02	18.99	17.53	20.43	18.58	29.51	16.03	19.20
55.90	58.53	24.28	19.20	18.48	52.12	37.22	18.63	27.71	20.02	18.40	21.59	19.57	31.29	16.82	20.35
58.80	61.91	25.78	20.48	19.47	54.96	38.20	20.24	29.69	21.26	19.43	22.95	20.77	33.22	17.73	21.60
55.30	65.93	27.51	22.17	20.59	58.13	41.39	21.84	32.04	22.71	20.59	24.51	22.15	35.53	18.80	23.45
56.50	70.51	29.66	-0.00	21.79	61.67	43.39	23.53	34.67	24.23	21.87	26.29	23.70	38.12	19.96	25.30
56.80	75.20	32.05	-0.00	23.19	65.67	46.04	25.31	37.51	25.83	23.27	28.26	25.39	40.84	21.32	27.28

TABLE NO. 17 - PLATE GAS RESPONSES FOR THE FIRST GROUP (19.2 HRS) AND THE SECOND GROUP (50. HRS). THESE ARE EQUIVALENT AMP.-HRS. VOLUME IN CC.

GRP	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13	PL=14	PL=15
FIRST	25.49	22.59	29.31	19.24	35.60	21.50	23.27	24.87	45.13	24.84	26.94	21.28	17.73	22.17	19.72
SECOND	52.07	21.37	18.92	16.68	47.98	35.72	16.67	24.13	17.84	16.52	19.13	17.52	27.73	15.17	17.83

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE NO. 18 - FIRST AND SECOND GROUP PLATE CUT-OFF TIMES AND AMPERE-HOURS CAPACITIES.

HRS	PL=1	PL=2	PL=3	PL=4	PL=5	PL=6	PL=7	PL=8	PL=9	PL=10	PL=11	PL=12	PL=13	PL=14	PL=15
1-TIME	22.20	22.18	21.47	20.67	22.25	21.28	21.67	22.59	22.28	21.80	20.72	22.57	21.97	21.48	22.38
1-AH	57.72	57.67	55.82	53.74	57.85	56.89	56.34	58.73	57.93	56.68	53.87	58.68	57.12	55.85	54.13
2-TIME	53.00	53.20	56.30	59.60	58.63	57.50	57.80	59.53	59.12	58.67	59.70	59.05	57.80	60.00	56.75
2-AH	58.00	58.20	56.30	59.60	58.63	57.50	57.80	59.53	59.12	58.67	59.70	59.05	57.80	60.00	56.75

REPRODUCTION
ORIGINAL PAGE IS FOR

TABLE NO. 19 - TOTAL GAS (HYDROGEN + OXYGEN) ACCUMULATED DURING OPEN
CIRCUIT STAND FJR CELLS IN PHASE B. TABLE LISTS ALL THE
SPECIAL CELLS ON TEST.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S03	-0.0 134.7	0.00 285.50	22.5 165.2	99.09 310.06	38.9 181.8	141.56 315.70	62.7 205.5	201.96 329.86	90.7 212.3	243.03 338.35
S04	-0.0 134.5 254.7	0.00 636.20 1109.85	22.5 165.2	152.89 729.52	37.3 181.8	233.11 782.37	62.8 205.4	362.40 848.43	90.6 229.3	484.14 970.17
S06	-0.0 134.4	0.00 625.71	22.6 165.2	143.45 726.49	37.4 181.8	223.67 755.94	63.1 205.4	354.85 823.89	90.5 212.4	473.76 852.21
S07	-0.0 134.3 254.8	0.00 358.62 667.87	22.5 165.0	105.70 397.32	37.5 181.8	149.11 422.80	63.2 205.4	229.33 450.62	90.4 228.2	286.90 563.78
S09	-0.0 135.3	0.00 66.59	22.6 165.0	88.71 201.13	37.7 181.9	123.14 299.62	63.2 205.4	183.54 311.89	90.3 212.5	222.23 320.38
S11	-0.0 134.3	0.00 50.96	22.6 181.9	51.91 54.28	38.0 205.3	50.96 51.91	63.8 228.2	52.40 67.95	90.3 250.4	54.74 67.95
S12	-0.0 106.3	0.00 709.70	22.3 156.2	171.76 227.67	22.6 164.8	181.20 980.56	38.1 161.9	290.67 1065.04	61.6 205.2	448.28 1193.64
S13	-0.0 135.1 255.8	0.00 136.84 200.07	22.6 164.8	77.39 144.39	38.3 181.9	109.47 143.45	63.8 205.2	115.14 143.45	90.7 229.2	135.90 168.93
S16	-0.0 135.1	0.00 381.77	22.6 164.7	109.47 429.90	38.4 181.9	155.72 461.04	63.8 205.2	245.37 495.96	90.0 212.6	300.60 513.89
S17	-0.0 108.5 250.4	0.00 271.80 444.51	22.6 135.1	96.26 287.84	38.7 164.7	137.79 316.16	63.8 161.9	202.81 328.65	63.9 205.0	202.91 338.81
S18	-0.0 108.5	0.00 381.77	22.7 135.0	63.43 385.65	38.7 164.7	61.52 392.13	48.2 161.9	100.98 388.57	63.8 204.8	193.02 398.75
S19	-0.0 104.5 250.4	0.00 750.24 1560.02	18.1 134.8 256.7	171.76 876.40 1605.32	22.7 164.8	230.27 1033.41	37.6 161.9	343.52 1122.12	65.6 204.9	474.71 1218.36
S22	-0.0 108.7	0.00 707.81	18.2 134.7	151.00 812.57	22.7 164.3	199.13 947.52	38.8 161.9	311.44 1022.08	65.7 204.5	477.54 1105.13
S23	-0.0 134.7 212.8	0.00 427.52 1826.27	22.9 164.2	120.80 477.54	39.0 182.0	187.41 520.01	65.8 204.5	279.35 557.76	89.4 228.8	343.52 629.48
S24	-0.0 89.3 212.8	0.00 923.93 1826.27	14.2 109.1	167.99 1039.09	23.0 134.5	304.83 1247.54	39.2 163.9	463.38 1460.92	48.1 182.0	574.74 1601.54
S25	-0.0 134.6	0.00 205.74	23.0 163.8	90.60 216.23	39.3 182.0	117.02 221.78	66.2 204.4	167.04 221.78	89.3 228.8	189.69 244.43

203.85
506.83

TABLE NO. 20. - TOTAL GAS (HYDROGEN + OXYGEN) ACCUMULATED DURING OPEN
CIRCUIT STAND FOR CELLS IN PHASE B. TABLE LISTS ALL THE
PRODUCTION CELLS ON TEST.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
P02	-0.0 135.8	0.00 696.49	23.5 162.5	169.87 779.54	40.2 182.6	274.53 850.32	59.1 205.7	438.84 911.66	88.3 212.8	526.61 954.13	109.8	613.44
P03	-0.0 135.7 253.5	0.00 469.04 805.02	23.4 162.7	135.90 526.61	40.3 182.6	208.57 572.86	69.3 203.8	311.44 612.98	88.3 228.0	358.17 698.37	110.1 250.4	410.53 794.64
P04	-0.0 135.7	0.00 344.47	23.5 162.8	105.70 375.61	40.4 182.6	152.89 402.98	69.3 203.8	237.82 426.57	88.3 212.9	270.86 443.56	110.1	315.21
P06	-0.0 135.7 253.6	0.00 181.20 282.18	23.4 162.9	73.51 190.64	40.5 182.5	98.15 191.58	69.3 203.8	151.00 205.74	88.4 228.2	167.04 245.37	110.1 250.4	180.26 274.63
P07	-0.0 135.6	0.00 116.08	23.4 163.0	53.79 117.02	40.6 182.5	70.78 115.14	69.3 203.8	101.92 112.31	88.4 212.9	112.31 114.19	110.0	117.97
P08	-0.0 135.6 253.7	0.00 390.71 637.03	23.3 163.0	122.69 421.86	40.7 182.5	182.14 445.45	69.4 203.9	270.86 479.42	88.4 228.2	309.55 550.21	110.0 250.4	355.79 627.59
P09	-0.0 135.5 213.0	0.00 822.95 1634.57	16.3 109.8	162.32 988.11	23.3 135.6	253.87 1149.49	40.8 163.2	423.74 1315.59	47.9 182.4	503.96 1438.27	68.8 203.9	677.61 1568.51
P11	-0.0 135.5 253.8	0.00 133.07 263.31	23.4 163.3	23.59 157.61	40.8 182.4	33.03 179.31	69.4 204.0	55.68 181.20	88.8 228.3	78.33 219.89	109.7 250.5	108.53 257.64
P12	-0.0 135.3	0.00 907.77	23.3 163.3	99.09 711.59	40.9 182.4	159.49 784.26	69.4 204.0	322.76 855.98	88.8 213.0	419.02 896.56	109.5	515.29
P13	-0.0 135.2 253.8	0.00 45.30 78.33	23.3 163.5	22.65 50.96	41.0 182.4	-0.00 49.07	69.5 204.1	30.20 50.96	89.0 228.5	34.64 67.01	109.5 250.5	46.24 75.50
P14	-0.0 135.1	0.00 208.57	23.2 163.5	75.50 234.77	41.0 182.4	103.81 250.09	69.6 204.8	156.66 287.14	89.1 213.0	174.59 302.00	109.5	191.58
P16	-0.0 135.1 253.9	0.00 164.87 613.44	23.2 163.5	34.92 247.26	41.2 182.3	51.91 315.67	69.6 204.1	76.44 369.01	89.1 228.6	91.54 481.31	109.4 250.5	114.19 598.34
P17	-0.0 135.0	0.00 80.22	23.1 163.7	42.47 74.56	41.2 182.3	59.46 71.72	69.7 204.3	76.44 78.33	89.2 213.1	83.99 87.77	109.3	53.05
P18	-0.0 135.0 254.4	0.00 136.84 180.26	23.1 163.7	51.74 139.67	41.3 182.3	80.22 140.62	69.7 204.3	114.19 140.62	89.2 228.7	125.52 155.72	109.3 250.5	134.01 177.42
P19	-0.0 134.9 254.6	0.00 158.73 213.29	23.1 163.7	41.52 137.79	41.3 182.3	72.67 137.79	69.7 204.4	110.42 136.84	89.2 228.7	124.57 173.65	109.3 250.5	131.18 215.17

TABLE NO. 22 - TIMES AND VOLUME OF OXYGEN MEASURED DURING OPEN CIRCUIT STAND FOR CELLS. TABLE LISTS THE DATA FOR PRODUCTION CELLS.
***** INDICATES THE SAMPLE WAS INADVERTENTLY LOST.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
P02	23.5	1.02	40.2	1.05	69.1	1.31	109.8	0.70	162.5	1.16
TOTAL OXYGEN FROM CELL P02 =		6.87 CC.								1.65
P03	23.4	2.58	40.3	1.37	69.3	1.31	110.1	1.40	162.7	1.51
TOTAL OXYGEN FROM CELL P03 =		11.04 CC.								1.55
P04	40.4	1.53	88.3	0.99	162.8	0.38	212.9	0.68		
TOTAL OXYGEN FROM CELL P04 =		3.52 CC.								
P06	40.5	0.74	182.5	1.82	253.6	2.29				
TOTAL OXYGEN FROM CELL P06 =		4.85 CC.								
P07	40.6	2.63								
TOTAL OXYGEN FROM CELL P07 =		2.63 CC.								
P08	23.3	3.44	40.7	1.07	88.4	2.29	163.0	2.19	228.2	2.31
TOTAL OXYGEN FROM CELL P08 =		12.91 CC.								1.61
P09	16.3	1.62	23.3	0.64	40.8	2.04	163.1*****	66.8	88.5	1.16
		109.8	0.83	135.6	1.45	163.2	1.66	182.4	0.79	213.0
TOTAL OXYGEN FROM CELL P09 =		14.18 CC.								0.49
P11	109.7	3.94	228.3	3.54	253.8	1.40				
TOTAL OXYGEN FROM CELL P11 =		8.88 CC.								
P12	40.9	2.71	59.4	1.31	88.8	0.90	109.5	1.22	135.3	1.07
		204.0	1.30							0.43
TOTAL OXYGEN FROM CELL P12 =		9.34 CC.								
P13	253.8	6.36								
TOTAL OXYGEN FROM CELL P13 =		6.36 CC.								
P14	41.0	2.05	135.1	1.81	204.8	0.75				
TOTAL OXYGEN FROM CELL P14 =		4.60 CC.								
P16	109.4	4.83	163.5	1.33	204.1	0.85	228.6	1.12	253.9	1.45
TOTAL OXYGEN FROM CELL P16 =		9.59 CC.								
P17	213.1	5.78								
TOTAL OXYGEN FROM CELL P17 =		5.78 CC.								
P18	41.3	3.59	254.4	4.12						
TOTAL OXYGEN FROM CELL P18 =		7.71 CC.								
P19	41.3	3.96	228.7	5.35	254.6	1.70				
TOTAL OXYGEN FROM CELL P19 =		11.01 CC.								

REPRODUCTION OF ORIGINAL PAGE IS POOR

TABLE NO. 23 - TOTAL GAS (HYDROGEN + OXYGEN) PRODUCED DURING DISCHARGE OF THE CELLS IN THE FIRST GROUP. 4TH READING = 1.41 CUT-OFF TIME, 5TH IS THE 1. VOLT TIME AND LAST READING IS AFTER AT LEAST 4 HOURS STAND AFTER DISCHARGE.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S03	10.6	30.20	18.8	67.95	33.6	104.76	41.8	110.42	43.4	112.31	62.5	104.76
S06	10.6	46.24	18.3	73.61	33.7	94.37	40.8	94.37	42.7	94.37	62.5	94.37
S09	10.6	41.52	18.2	65.12	33.9	83.05	39.1	86.82	42.7	100.04	62.5	88.71
S12	10.6	59.46	17.3	94.37	34.0	151.00	41.5	153.83	43.5	151.00	62.5	151.00
S16	10.6	46.24	17.6	70.78	34.2	95.32	40.3	97.21	42.6	95.32	62.5	95.32
S18	10.6	62.29	17.7	94.37	34.4	134.96	40.9	140.62	42.8	134.96	62.5	134.96
S22	10.7	61.34	17.8	93.43	34.6	127.41	39.5	138.73	42.0	138.73	62.5	134.96
S24	10.7	72.67	18.0	104.76	34.8	159.49	39.8	178.37	42.1	178.37	62.5	182.14
P02	10.4	60.40	21.0	98.15	34.9	134.96	41.9	146.28	43.7	144.39	62.5	134.96
P04	10.4	17.93	21.2	57.57	35.1	107.59	42.0	130.24	43.8	130.24	62.5	107.59
P07	10.5	26.42	21.4	58.51	35.2	83.99	42.3	99.09	44.3	99.09	62.5	83.99
P09	10.5	70.78	21.6	129.29	35.3	174.59	41.8	182.14	43.5	174.59	62.5	174.59
P12	10.5	58.51	21.8	95.32	35.5	122.50	40.5	137.60	42.5	133.82	62.5	122.50
P14	10.5	57.57	21.9	102.87	35.6	131.18	41.7	146.28	43.7	142.51	62.5	142.51
P17	10.6	28.31	22.0	50.96	35.8	66.06	40.6	77.39	43.0	78.33	62.5	77.39

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

TABLE NO 24 - TOTAL GAS(HYDROGEN + OXYGEN) PRODUCED DURING DISCHARGE OF THE CELLS IN THE SECOND GROUP. 4TH READING= 1.41 CUT-OFF TIME, 5TH IS THE 1. VOLT TIME AND LAST READING IS AFTER AT LEAST 4 HOURS STAND AFTER DISCHARGE.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
	10.0	56.62	18.2	91.54	34.1	130.24	40.5	130.24	42.3	130.24	47.1	130.24
S04	10.0	56.62	18.2	91.54	34.1	130.24	40.5	130.24	42.3	130.24	47.1	130.24
S07	10.0	52.85	18.3	83.05	34.3	117.97	40.6	123.63	42.6	117.97	47.1	117.97
S11	10.0	52.85	18.4	86.82	34.4	122.69	41.3	122.69	43.0	122.69	47.1	122.69
S13	10.0	32.09	18.6	58.51	34.6	82.11	41.5	97.21	43.1	97.21	46.5	97.21
S17	10.0	54.74	18.7	86.82	34.8	121.74	40.8	138.73	42.5	136.84	46.6	141.56
S19	10.0	63.23	18.8	94.37	34.8	119.86	40.6	134.96	42.4	127.41	46.7	127.41
S23	10.0	49.07	19.2	80.22	35.1	114.19	40.5	129.29	42.6	125.52	46.8	125.52
S25	10.0	33.97	19.3	32.09	35.3	61.34	40.5	88.71	42.3	88.71	46.9	86.82
P03	10.0	37.75	19.5	67.01	35.4	101.92	41.0	120.80	43.0	120.80	46.9	120.80
P06	10.0	34.92	19.8	57.57	35.5	88.71	41.7	101.92	43.5	98.15	47.0	100.04
P08	10.0	49.07	19.9	79.27	35.7	104.76	41.8	112.31	43.9	108.53	47.1	104.76
P11	10.0	48.13	20.0	83.05	35.8	103.81	41.4	103.81	43.8	103.81	47.1	103.81
P13	10.0	39.64	20.2	75.50	36.1	98.15	41.8	98.15	44.0	98.15	47.1	98.15
P16	10.0	52.85	20.3	79.27	36.3	105.70	41.3	105.70	43.2	105.70	47.1	105.70
P18	10.0	20.76	20.5	46.24	36.3	54.74	41.8	54.74	43.7	54.74	47.1	54.74
P19	10.0	43.41	20.4	73.61	36.5	78.33	41.8	84.94	44.1	84.94	47.1	84.94

TABLE NO. 25. - TIMES AND VOLUME OF OXYGEN PRODUCED DURING DISCHARGE FOR FIRST GROUP OF CELLS. TIMES SHOWN ONLY WHEN ANALYSES MADE.
*** - SAMPLE INADVERTENTLY LOST.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S03	18.8	9.72	33.6	6.38				
TOTAL OXYGEN FROM CELL S03 =			16.10	CC.				
S06	18.3	9.64	33.7	4.41				
TOTAL OXYGEN FROM CELL S06 =			14.06	CC.				
S09	18.2	5.48	33.9	2.08	62.5	0.59		
TOTAL OXYGEN FROM CELL S09 =			8.15	CC.				
S12	17.3	13.31	34.0	14.30				
TOTAL OXYGEN FROM CELL S12 =			27.60	CC.				
S16	17.6	8.62	34.2	3.32				
TOTAL OXYGEN FROM CELL S16 =			11.94	CC.				
S18	17.7	10.52	34.4	5.93				
TOTAL OXYGEN FROM CELL S18 =			16.46	CC.				
S22	17.8	6.37	34.6	2.08	62.5	0.19		
TOTAL OXYGEN FROM CELL S22 =			8.64	CC.				
S24	18.0	7.10	34.8	0.81	62.5	0.43		
TOTAL OXYGEN FROM CELL S24 =			8.34	CC.				
P02	21.0	10.85	34.9	4.03				
TOTAL OXYGEN FROM CELL P02 =			14.88	CC.				
P04	21.2	3.15	35.1	1.92				
TOTAL OXYGEN FROM CELL P04 =			5.08	CC.				
P07	21.4	7.27	35.2	2.74				
TOTAL OXYGEN FROM CELL P07 =			10.01	CC.				
P09	21.6	20.04	35.3	8.40				
TOTAL OXYGEN FROM CELL P09 =			26.44	CC.				
P12	21.8	8.85	35.5	1.77				
TOTAL OXYGEN FROM CELL P12 =			10.62	CC.				
P14	21.9	12.63	35.6	3.60	62.5	0.49		
TOTAL OXYGEN FROM CELL P14 =			16.72	CC.				
P17	22.0	6.70	35.8	1.53	62.5	1.23		
TOTAL OXYGEN FROM CELL P17 =			9.47	CC.				

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TABLE NO. 20. - TIMES AND VOLUME OF OXYGEN PRODUCED DURING DISCHARGE FOR SECOND GROUP OF CELLS. TIMES SHOWN ONLY WHEN ANALYSES MADE.
*** = SAMPLE INADVERTENTLY LOST.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S04	18.2	13.34	34.1	8.01								
TOTAL OXYGEN FROM CELL S04 =				21.39 CC.								
S07	18.3	11.75	34.3	5.57								
TOTAL OXYGEN FROM CELL S07 =				17.32 CC.								
S11	18.4	11.39	34.4	6.60								
TOTAL OXYGEN FROM CELL S11 =				17.99 CC.								
S13	18.6	6.20	34.6	4.33	46.5	1.39						
TOTAL OXYGEN FROM CELL S13 =				11.92 CC.								
S17	18.7	11.62	34.8	4.95	46.6	1.84						
TOTAL OXYGEN FROM CELL S17 =				18.41 CC.								
S19	18.8	10.70	34.8	1.29	46.7	0.32						
TOTAL OXYGEN FROM CELL S19 =				12.31 CC.								
S23	19.2	6.22	35.1	0.70	46.8	0.20						
TOTAL OXYGEN FROM CELL S23 =				7.12 CC.								
S25	19.3	2.85	35.3	3.07	46.9	2.65						
TOTAL OXYGEN FROM CELL S25 =				8.56 CC.								
P03	19.5	5.15	35.4	2.53	46.9	0.89						
TOTAL OXYGEN FROM CELL P03 =				8.56 CC.								
P06	19.8	3.47	35.5	1.36	47.0	0.66						
TOTAL OXYGEN FROM CELL P06 =				5.48 CC.								
P08	19.9	3.84	35.7	2.17								
TOTAL OXYGEN FROM CELL P08 =				6.01 CC.								
P11	20.0	13.95	35.8	4.15								
TOTAL OXYGEN FROM CELL P11 =				18.10 CC.								
P13	20.2	11.00	36.1	3.81								
TOTAL OXYGEN FROM CELL P13 =				14.81 CC.								
P16	20.3	9.70	36.3	4.09								
TOTAL OXYGEN FROM CELL P16 =				13.73 CC.								
P18	20.5	5.29	36.3*****									
TOTAL OXYGEN FROM CELL P18 =				5.29 CC.								
P19	20.4	10.14	47.1	0.94								
TOTAL OXYGEN FROM CELL P19 =				11.08 CC.								

TABLE NO. 27. - VOLTAGES DURING DISCHARGE FOR CELL OF FIRST GROUP ARE SHOWN
DOWN TO 1. VOLT. THE OPEN CIRCUIT VOLTAGES WERE 1.85 BEFORE
AND 1.58 AFTER.

TIME HOURS	CELLS			CELLS			CELLS			CELLS			CELLS			CELLS		
	S03	S06	S09	S12	S16	S18	S22	S24	P02	P04	P07	P09	P12	P14	P17			
0.75	1.52	1.53	1.51	1.53	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52			
10.30	1.53	1.53	1.50	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53			
19.00	1.53	1.53	1.50	1.52	1.52	1.53	1.52	1.53	1.52	1.52	1.52	1.52	1.52	1.52	1.52			
33.10	1.51	1.51	1.47	1.51	1.51	1.51	1.51	1.51	1.52	1.52	1.52	1.52	1.51	1.51	1.51			
34.25	1.51	1.51	1.46	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.51	1.50			
35.00	1.49	1.49	1.45	1.50	1.49	1.49	1.49	1.49	1.50	1.50	1.50	1.50	1.50	1.50	1.50			
35.50	1.50	1.50	1.45	1.49	1.49	1.49	1.49	1.49	1.50	1.49	1.49	1.49	1.49	1.49	1.49			
36.00	1.50	1.50	1.45	1.49	1.49	1.49	1.49	1.49	1.50	1.50	1.50	1.50	1.50	1.50	1.49			
36.50	1.49	1.49	1.45	1.49	1.49	1.49	1.49	1.49	1.50	1.49	1.49	1.50	1.50	1.50	1.49			
37.00	1.49	1.49	1.44	1.49	1.49	1.49	1.49	1.49	1.50	1.49	1.49	1.50	1.50	1.50	1.49			
37.60	1.49	1.49	1.43	1.49	1.48	1.48	1.47	1.47	1.50	1.49	1.49	1.49	1.49	1.49	1.50			
38.00	1.49	1.48	1.43	1.48	1.47	1.48	1.46	1.46	1.49	1.48	1.48	1.48	1.48	1.48	1.48			
38.50	1.48	1.47	1.43	1.48	1.46	1.47	1.45	1.45	1.48	1.48	1.48	1.48	1.47	1.48	1.47			
38.75	1.48	1.47	1.43	1.48	1.46	1.47	1.44	1.45	1.48	1.47	1.47	1.47	1.46	1.47	1.46			
39.25	1.47	1.46	1.34	1.46	1.46	1.46	1.43	1.43	1.47	1.47	1.47	1.47	1.45	1.47	1.45			
39.50	1.46	1.44	1.32	1.46	1.45	1.44	1.41	1.42	1.46	1.46	1.46	1.46	1.44	1.45	1.44			
39.75	1.46	1.44	1.32	1.45	1.42	1.43	1.40	1.41	1.46	1.46	1.46	1.45	1.43	1.45	1.43			
40.00	1.46	1.43	1.33	1.45	1.42	1.43	1.39	1.40	1.46	1.45	1.46	1.45	1.42	1.45	1.42			
40.25	1.45	1.43	1.32	1.45	1.42	1.43	1.38	1.39	1.46	1.46	1.47	1.46	1.42	1.45	1.42			
40.50	1.45	1.42	1.31	1.44	1.42	1.43	1.36	1.38	1.46	1.45	1.46	1.45	1.41	1.44	1.42			
41.00	1.44	1.39	1.30	1.43	1.37	1.40	1.31	1.33	1.45	1.45	1.46	1.44	1.38	1.44	1.40			
41.25	1.43	1.36	1.28	1.43	1.35	1.40	1.26	1.28	1.44	1.44	1.45	1.42	1.36	1.43	1.38			
41.50	1.42	1.35	1.26	1.41	1.31	1.37	1.20	1.20	1.43	1.43	1.44	1.42	1.34	1.42	1.36			
41.75	1.40	1.30	1.24	1.40	1.26	1.34	1.10	1.12	1.42	1.42	1.43	1.40	1.23	1.40	1.33			
42.00	1.37	1.24	1.20	1.38	1.20	1.30	0.00	1.04	1.40	1.41	1.43	1.38	1.21	1.39	1.30			
42.25	1.35	1.17	1.16	1.26	1.11	1.23	0.00	0.00	1.38	1.39	1.41	1.36	1.10	1.37	1.24			
42.50	1.31	1.07	1.10	1.02	1.14	0.00	0.00	1.36	1.37	1.40	1.32	1.32	0.00	1.34	1.18			
42.75	1.26	0.00	0.00	1.28	0.00	1.03	0.00	0.00	1.34	1.35	1.32	1.27	0.00	1.31	1.10			
42.75	1.26	0.00	0.00	1.28	0.00	1.03	0.00	0.00	1.34	1.35	1.38	1.27	0.00	1.31	1.10			
43.00	1.20	0.00	0.00	1.22	0.00	0.00	0.00	0.00	1.30	1.32	1.36	1.20	0.00	1.26	1.02			
43.25	1.06	0.00	0.00	1.12	0.00	0.00	0.00	0.00	1.22	1.26	1.32	1.07	0.00	1.17	0.00			
43.50	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.00	1.15	1.22	1.30	0.00	0.00	1.09	0.00			
43.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	1.21	0.00	0.00	0.00	0.00			
44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13	0.00	0.00	0.00	0.00			
44.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00			

TABLE NO. 23. - VOLTAGES DURING DISCHARGE FOR CELL OF SECOND GROUP ARE SHOWN
DOWN TO 1. VOL. THE OPEN CIRCUIT VOLTAGES WERE 1.85 BEFORE
AND WERE ALL 1.58 EXCEPT S11=1.56, P16=1.56 AFTER.

TIME HOURS	CELLS			CELLS			CELLS			CELLS			CELLS			P18	P19
	S04	S07	S11	S13	S17	S19	S23	S25	P03	P06	P08	P11	P13	P16			
0.50	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	
10.20	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	
36.50	1.48	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
37.50	1.47	1.48	1.48	1.48	1.48	1.48	1.47	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.49	1.49	
38.00	1.46	1.47	1.47	1.48	1.47	1.46	1.46	1.46	1.47	1.48	1.48	1.47	1.48	1.47	1.47	1.46	
38.50	1.45	1.46	1.47	1.48	1.47	1.46	1.46	1.46	1.47	1.48	1.48	1.47	1.48	1.47	1.47	1.46	
39.00	1.45	1.46	1.46	1.47	1.46	1.46	1.46	1.46	1.47	1.48	1.48	1.47	1.48	1.46	1.46	1.46	
39.50	1.44	1.45	1.46	1.47	1.46	1.46	1.45	1.45	1.46	1.48	1.48	1.46	1.48	1.46	1.46	1.47	
40.00	1.43	1.44	1.46	1.46	1.45	1.44	1.43	1.44	1.45	1.47	1.47	1.46	1.46	1.45	1.46	1.47	
40.25	1.42	1.44	1.45	1.46	1.44	1.44	1.43	1.44	1.44	1.46	1.46	1.46	1.46	1.46	1.46	1.47	
40.50	1.41	1.52	1.44	1.45	1.43	1.42	1.41	1.41	1.43	1.45	1.46	1.44	1.46	1.44	1.46	1.46	
41.75	1.38	1.40	1.42	1.44	1.41	1.40	1.39	1.38	1.42	1.44	1.45	1.43	1.45	1.42	1.44	1.45	
41.00	1.37	1.38	1.42	1.43	1.40	1.39	1.38	1.37	1.41	1.44	1.45	1.43	1.45	1.42	1.44	1.45	
41.25	1.34	1.36	1.40	1.42	1.38	1.36	1.35	1.34	1.39	1.43	1.44	1.41	1.43	1.41	1.43	1.43	
41.60	1.24	1.32	1.36	1.40	1.33	1.30	1.27	1.26	1.36	1.41	1.42	1.39	1.42	1.37	1.41	1.42	
41.80	1.21	1.30	1.35	1.38	1.30	1.27	1.24	1.22	1.35	1.40	1.42	1.38	1.41	1.36	1.40	1.41	
42.00	1.14	1.25	1.31	1.36	1.23	1.20	1.16	1.13	1.32	1.39	1.40	1.36	1.40	1.34	1.39	1.40	
42.25	1.03	1.16	1.26	1.32	1.10	1.06	1.04	1.00	1.27	1.35	1.38	1.34	1.38	1.28	1.36	1.38	
42.60	-0.00	1.04	1.20	1.27	1.00	-0.00	1.00	-0.00	1.20	1.32	1.36	1.34	1.38	1.28	1.36	1.38	
42.75	-0.00	-0.00	1.12	1.20	-0.00	-0.00	-0.00	-0.00	1.10	1.28	1.32	1.26	1.32	1.14	1.28	1.34	
43.00	-0.00	-0.00	1.00	1.06	-0.00	-0.00	-0.00	-0.00	1.00	1.16	1.22	1.20	1.26	1.01	1.18	1.30	
43.50	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	1.00	1.12	1.08	1.14	-0.00	1.02	1.20	
43.75	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	1.05	1.01	1.08	-0.00	0.00	1.18	

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TABLE NO. 23. - CAPACITIES FOR THE FIRST GROUP OF CELLS

	CELL CAPACITIES	
S03	1.00 VOLT CUT-OFF= 43.4 HRS, 1.41 VOLT CUT-OFF= 41.8 HRS.	
S06	1.00 VOLT CUT-OFF= 42.7 HRS, 1.41 VOLT CUT-OFF= 40.8 HRS.	
S09	1.00 VOLT CUT-OFF= 42.7 HRS, 1.41 VOLT CUT-OFF= 39.1 HRS.	
S12	1.00 VOLT CUT-OFF= 43.5 HRS, 1.41 VOLT CUT-OFF= 41.5 HRS.	
S16	1.00 VOLT CUT-OFF= 42.6 HRS, 1.41 VOLT CUT-OFF= 40.3 HRS.	
S18	1.00 VOLT CUT-OFF= 42.8 HRS, 1.41 VOLT CUT-OFF= 40.9 HRS.	
S22	1.00 VOLT CUT-OFF= 42.0 HRS, 1.41 VOLT CUT-OFF= 39.5 HRS.	
S24	1.00 VOLT CUT-OFF= 42.1 HRS, 1.41 VOLT CUT-OFF= 39.8 HRS.	
P02	1.00 VOLT CUT-OFF= 43.7 HRS, 1.41 VOLT CUT-OFF= 41.9 HRS.	
P04	1.00 VOLT CUT-OFF= 43.9 HRS, 1.41 VOLT CUT-OFF= 42.0 HRS.	
P07	1.00 VOLT CUT-OFF= 44.3 HRS, 1.41 VOLT CUT-OFF= 42.3 HRS.	
P09	1.00 VOLT CUT-OFF= 43.5 HRS, 1.41 VOLT CUT-OFF= 41.7 HRS.	
P12	1.00 VOLT CUT-OFF= 42.5 HRS, 1.41 VOLT CUT-OFF= 40.5 HRS.	
P14	1.00 VOLT CUT-OFF= 43.6 HRS, 1.41 VOLT CUT-OFF= 41.7 HRS.	
P17	1.00 VOLT CUT-OFF= 43.0 HRS, 1.41 VOLT CUT-OFF= 40.6 HRS.	

TABLE NO. 30. - CAPACITIES FOR THE SECOND GROUP OF CELLS

	CELL CAPACITIES		
S04	1.00 VOLT CUT-OFF= 42.8 HRS,	1.41 VOLT CUT-OFF=	40.5 HRS.
S07	1.00 VOLT CUT-OFF= 43.2 HRS,	1.41 VOLT CUT-OFF=	40.6 HRS.
S11	1.00 VOLT CUT-OFF= 43.5 HRS,	1.41 VOLT CUT-OFF=	41.3 HRS.
S13	1.00 VOLT CUT-OFF= 43.6 HRS,	1.41 VOLT CUT-OFF=	41.5 HRS.
S17	1.00 VOLT CUT-OFF= 43.0 HRS,	1.41 VOLT CUT-OFF=	40.7 HRS.
S19	1.00 VOLT CUT-OFF= 42.9 HRS,	1.41 VOLT CUT-OFF=	40.6 HRS.
S22	1.00 VOLT CUT-OFF= 43.1 HRS,	1.41 VOLT CUT-OFF=	40.5 HRS.
S25	1.00 VOLT CUT-OFF= 42.3 HRS,	1.41 VOLT CUT-OFF=	40.5 HRS.
P03	1.00 VOLT CUT-OFF= 43.5 HRS,	1.41 VOLT CUT-OFF=	41.0 HRS.
P06	1.00 VOLT CUT-OFF= 44.0 HRS,	1.41 VOLT CUT-OFF=	41.6 HRS.
P08	1.00 VOLT CUT-OFF= 44.4 HRS,	1.41 VOLT CUT-OFF=	41.8 HRS.
P11	1.00 VOLT CUT-OFF= 44.3 HRS,	1.41 VOLT CUT-OFF=	41.4 HRS.
P13	1.00 VOLT CUT-OFF= 44.5 HRS,	1.41 VOLT CUT-OFF=	41.8 HRS.
P19	1.00 VOLT CUT-OFF= 44.6 HRS,	1.41 VOLT CUT-OFF=	41.8 HRS.
P16	1.00 VOLT CUT-OFF= 43.7 HRS,	1.41 VOLT CUT-OFF=	41.5 HRS.
P18	1.00 VOLT CUT-OFF= 44.2 HRS,	1.41 VOLT CUT-OFF=	41.8 HRS.

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TABLE NO. 31. - ACCUMULATED VOLUMES OF OXYGEN VERSUS TIME DURING OPEN CIRCUIT
STAND.

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S03	36.9	2.97	90.7	4.53	212.3	6.27	90.6	4.53	134.5	5.73	165.2	6.10
S04	22.5	1.99	37.3	2.77	62.8	3.80	90.5	4.31	134.4	5.37	165.2	5.97
S06	205.4	7.05	239.2	8.77	254.7	10.23	205.4	5.90	229.2	8.01	254.8	9.39
S07	37.5	2.83	90.4	4.49	165.0	8.05	90.3	4.47	108.3	6.51	134.2	7.30
S09	37.7	4.43	90.3	6.42	212.5	8.05	90.3	4.47	108.3	6.51	134.2	7.30
S11	254.9	0.85	38.1	3.37	61.6	4.47	90.3	4.47	108.3	6.51	134.2	7.30
S12	22.3	2.06	38.1	3.37	61.6	4.47	90.3	4.47	108.3	6.51	134.2	7.30
S13	164.8	8.53	205.2	9.81	255.8	7.91	212.6	6.14	212.6	6.14	212.6	6.14
S16	38.4	2.80	90.0	4.11	164.7	5.27	212.6	6.14	212.6	6.14	212.6	6.14
S17	38.7	3.31	89.8	4.96	205.0	5.34	212.7	7.49	212.7	7.49	212.7	7.49
S18	48.2	0.53	63.9	1.23	89.8	6.78	212.7	7.49	212.7	7.49	212.7	7.49
S19	18.1	1.03	37.6	2.23	65.6	3.54	89.6	4.84	108.5	5.78	134.8	6.78
S22	164.4	7.73	204.9	8.66	229.0	10.19	256.7	12.36	108.5	5.78	134.7	2.21
S22	18.2	2.26	38.8	3.71	65.7	5.70	89.4	6.89	108.5	5.78	134.7	2.21
S23	164.3	9.56	204.5	10.66	256.7	12.36	256.7	12.36	108.5	5.78	134.7	2.21
S24	22.9	4.23	39.0	4.92	65.8	6.36	109.0	8.06	164.2	10.15	228.8	12.89
S24	257.0	14.49	23.0	3.24	39.2	4.66	48.1	5.43	65.9	6.86	89.3	8.57
S25	109.1	9.56	134.5	10.67	163.9	13.23	162.0	14.36	204.4	15.61	212.8	16.97
P02	23.5	1.02	40.2	3.38	69.1	5.26	109.8	4.08	162.5	5.24	203.7	6.27
P03	22.4	2.58	40.3	3.96	69.3	5.26	110.1	6.66	162.7	8.17	228.0	9.71
P04	40.4	1.53	38.3	2.52	162.8	2.90	212.9	3.58	212.9	3.58	212.9	3.58
P06	40.5	0.74	182.5	2.56	253.6	4.85	212.9	3.58	212.9	3.58	212.9	3.58
P07	40.6	2.63	40.7	4.51	88.4	6.80	163.0	8.99	228.2	11.30	253.7	12.91
P08	23.3	3.44	40.7	4.51	88.4	6.80	163.0	8.99	228.2	11.30	253.7	12.91
P09	16.3	1.62	23.3	2.26	40.8	4.30	163.1	4.30	68.8	6.73	88.5	7.90
P11	109.7	3.94	228.3	7.48	253.8	8.88	163.1	4.30	68.8	6.73	88.5	7.90
P12	40.9	2.71	69.4	4.02	88.8	4.91	109.5	6.14	135.3	7.21	163.3	8.04
P13	253.8	6.36	135.1	3.86	204.8	4.60	228.6	8.14	253.9	9.59	253.9	9.59
P14	41.0	2.05	163.5	6.16	204.1	7.01	228.6	8.14	253.9	9.59	253.9	9.59
P16	109.4	4.83	213.1	5.78	254.4	7.71	254.6	11.01	254.6	11.01	254.6	11.01
P17	213.1	5.78	254.4	7.71	254.6	11.01	254.6	11.01	254.6	11.01	254.6	11.01
P18	41.3	3.59	228.7	9.31	254.6	11.01	254.6	11.01	254.6	11.01	254.6	11.01
P19	41.3	3.59	228.7	9.31	254.6	11.01	254.6	11.01	254.6	11.01	254.6	11.01

TABLE NO. 32. - ACCUMULATED VOLUME OF OXYGEN DURING DISCHARGE FOR EACH GROUP OF CELLS.

FIRST GROUP

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S03	18.8	9.72	33.6	16.10						
S05	18.3	9.64	33.7	14.06						
S09	18.2	5.48	33.9	7.56	62.5	8.15				
S12	17.3	13.31	34.0	27.60						
S16	17.6	8.62	34.2	11.94						
S18	17.7	10.52	34.4	16.46						
S22	17.8	6.37	34.6	8.45	62.5	8.64				
S24	18.0	7.10	34.3	7.91	62.5	8.34				
P02	21.0	10.85	33.9	14.88						
P04	21.2	5.15	35.1	5.08						
P07	21.4	7.27	35.2	10.01						
P09	21.6	18.04	35.3	26.44						
P12	21.8	8.85	35.5	10.62						
P14	21.9	12.63	35.6	16.23	62.5	16.72				
P17	22.0	6.70	35.8	8.23	62.5	9.47				

SECOND GROUP

CELL NO.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.	TIME HRS.	VOL. CC.
S04	18.2	13.38	34.1	21.39						
S07	18.3	11.75	34.3	17.32						
S11	18.4	11.39	34.4	17.99						
S13	18.6	6.20	34.6	10.53						
S17	18.7	11.62	34.8	16.57	46.5	11.92				
S19	18.8	10.70	34.8	11.99	46.6	18.41				
S23	19.2	6.22	35.1	6.92	46.7	12.31				
S25	19.3	2.83	35.3	5.91	46.8	7.12				
P03	19.5	5.15	35.4	7.68	46.9	8.56				
P06	19.8	3.47	35.5	4.83	46.9	8.56				
P08	19.9	3.84	35.7	6.01	47.0	5.48				
P11	20.0	13.95	35.8	18.10						
P13	20.2	11.00	36.1	14.81						
P16	20.3	9.70	36.3	13.78						
P18	20.5	5.29	36.3	5.29						
P19	20.4	10.14	47.1	11.08						

REPRODUCED FROM
ORIGINAL

TABLE NO. 33. - OPEN CIRCUIT RESPONSE (140 HRS.) AND TOTAL OXYGEN PRODUCED
DURING DISCHARGE FOR ALL CELLS. VOLUME IN CC.

CELL NO.	O.C. RESP.	TOT.-DIS.
S03	6.05	16.1
S04	5.76	21.39
S06	5.41	14.06
S07	5.33	17.32
S09	8.39	8.15
S11	.85	17.99
S12	7.58	27.60
S13	4.59	11.92
S16	4.91	11.94
S17	6.13	18.41
S18	17.82	16.46
S19	6.73	12.31
S22	8.46	8.64
S23	8.99	7.12
S24	11.33	8.34
S25	8.77	8.56
P02	4.74	14.38
P03	7.47	8.56
P04	3.09	5.08
P06	1.83	5.48
P07	2.63	19.01
P08	8.22	6.61
P09	8.99	26.44
P11	4.73	18.10
P12	7.28	10.62
P13	5.36	14.81
P14	4.13	16.72
P16	5.59	13.78
P17	5.78	9.47
P18	4.87	5.29
P19	8.30	11.08